

VOLUME 16

PART I

NORTH AMERICAN FLORA

OPHIOGLOSSALES-FILICALES

OPHIOGLOSSACEAE

LUCIEN MARCUS UNDERWOOD, RALPH CURTISS BENEDICT

MARATTIACEAE

LUCIEN MARCUS UNDERWOOD

OSMUNDACEAE, CERATOPTERIDACEAE

RALPH CURTISS BENEDICT

SCHIZAEACEAE, GLEICHENIACEAE, CYATHEACEAE (pars)

WILLIAM RALPH MAXON



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ANNOUNCEMENT

The NORTH AMERICAN FLORA is designed to present in one work descriptions of all plants growing, independent of cultivation, in North America, here taken to include Greenland, Central America, the Republic of Panama, and the West Indies, except Trinidad, Tobago, and Curaçao and other islands off the north coast of Venezuela, whose flora is essentially South American.

The work will be published in parts at irregular intervals, by the New York Botanical Garden, through the aid of the income of the David Lydig Fund bequeathed by Charles P. Daly.

It is planned to issue parts as rapidly as they can be prepared, the extent of the work making it possible to commence publication at any number of points. The completed work will form a series of volumes with the following sequence:

Volume 1. Mycetozoa, Schizophyta, Diatomaceae.

Volumes 2 to 10. Fungi.

Volumes 11 to 13. Algae.

Volumes 14 and 15. Bryophyta.

Volume 16. Pteridophyta and Gymnospermae.

Volumes 17 to 19. Monocotyledones.

Volumes 20 to 32. Dicotyledones.

The preparation of the work has been referred by the Scientific Directors of the Garden to a committee consisting of Dr. N. L. Britton, Dr. W. A. Murrill, and Dr. J. H. Barnhart.

Professor George F. Atkinson, of Cornell University; Professors Charles R. Barnes and John M. Coulter, of the University of Chicago; Mr. Frederick V. Coville, of the United States Department of Agriculture; Professor Edward L. Greene, of the United States National Museum; Professor Byron D. Halsted, of Rutgers College; and Professor William Trelease, of the Missouri Botanical Garden, have consented to act as an advisory committee.

Each author will be wholly responsible for his own contributions, being restricted only by the general style adopted for the work, which must vary somewhat in the treatment of diverse groups.

The subscription price is fixed at \$1.50 for each part; it is expected that four or five parts will be required for each volume. A limited number of separate parts will be sold at \$2.00 each. Address:

THE NEW YORK BOTANICAL GARDEN

BRONX PARK

NEW YORK CITY

DIVISION PTERIDOPHYTA

BY LUCIEN MARCUS UNDERWOOD

Terrestrial, epiphytic, or rarely aquatic plants, manifesting in their life-history two well-marked phases of growth, the so-called alternation of generations: (I) The SPOROPHYTE or asexual plant, usually differentiated into root, stem, and leaf, having well-developed fibro-vascular tissues and producing spores asexually which are either minute and similar (homosporous series) or are of two unlike sorts called microspores and megaspores (heterosporous series). The spores germinate to form: (II) The GAMETOPHYTE or sexual plant (prothallium); in the homosporous series this is a non-vascular thalloid (or tuberous) structure, either chlorophyll-bearing and terrestrial or epiphytic, or subterranean and usually devoid of chlorophyll; in the heterosporous series it consists of much-reduced prothallia of two sorts, the one rising from the microspores and producing only male reproductive apparatus, the other rising from the megaspore and producing only female reproductive organs.

Sex-apparatus consisting of antheridia in which ciliate sperms are produced, and archegonia in which normally a single egg is developed. Fertilization consists in the union of a sperm and an egg from which the sporophyte develops, becoming ultimately the plant commonly known as a fern, club-moss, or horse-tail.

Order OPHIOGLOSSALES

BY LUCIEN MARCUS UNDERWOOD AND RALPH CURTISS BENEDICT

Sporophytes herbaceous, consisting of a somewhat tuberous rhizome, with fibrous usually fleshy roots and one or several leaves. Leaves erect or inflexed in vernation, non-articulate, consisting of a basal commonstalk bearing at its apex an entire or divided sterile lamina and usually only one erect sporangiophore (1-17 and pendent in *Cheiroglossa*); sporangiophore (sporophyll) stalked, spicate or paniculate. Sporangia developed from a group of epidermal and subepidermal cells (eusporangiate), in 2 rows, the walls many cells thick, transversely dehiscent. Spores uniform (homosporous), triplanate, ephemeral, yellow.

Gametophytes (prothallia) hypogean, tuberous, usually devoid of chlorophyll and associated with an endophytic mycorrhiza.

(A single family :)

Fam. 1. OPHIOGLOSSACEAE.

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Family 1. OPHIOGLOSSACEAE

BY LUCIEN MARCUS UNDERWOOD AND RALPH CURTISS BENEDICT

Characters of the order.

- Lamina and sporophyl pinnately or ternately divided ; venation free ; sporangia separate. 1. BOTRYCHIUM.
 Lamina and sporophyl simple or digitately lobed ; venation reticulate ; sporangia coalescent.
 Terrestrial ; sterile lamina entire, lanceolate to reniform ; sporophyls erect, single. 2. OPHIOGLOSSUM.
 Epiphytic ; sterile lamina digitately lobed, obdeltoid ; sporophyls pendent, usually more than one. 3. CHEIROGLOSSA.

1. BOTRYCHIUM Sw. Jour. Bot. Schrad. 1800² : 110. 1801.

Botrypus Rich. in Marthe, Cat. Jard. Méd. Paris 120. 1801.

Sceptridium Lyon, Bot. Gaz. 40 : 457. 1905.

Terrestrial plants. Rhizomes hypogean, small, mostly erect, the apex naked except for old persistent leaf-bases. Leaves herbaceous, solitary, the commonstalk erect, the lamina erect or inflexed in vernation, pinnately to ternately divided, the sporophyl solitary, erect, paniculate ; venation free, forking. Sporangia separate, globose, on the smaller divisions of the sporophyl.

Type species, *Osmunda Lunaria* L.

Bud hairless.

Commonstalk about one-half or more hypogean.

Lamina straight in vernation, the segments usually separated ; sporophyl long-stalked, often one-half to two-thirds the height of the plant.

1. *B. simplex*.

Lamina with the tip bent down in vernation, the segments crowded ; sporophyl short-stalked, scarcely exceeding the lamina.

2. *B. pumicola*.

Commonstalk nearly all epigean.

Lamina oblong to ovate or narrowly deltoid, with only the tip or upper part bent down in vernation ; sporophyl erect or with the tip bent down.

Lamina with the tip bent down in vernation, but not clasping the sporophyl, ovate to deltoid, acutish, sessile, usually only once pinnately divided, the segments rhombic to deltoid, acutish.

3. *B. boreale*.

Lamina with the tip or upper part bent down in vernation and clasping the sporophyl.

Lamina usually sessile or nearly so, only once pinnately divided with fan-shaped to lunulate segments.

Plants usually stout ; segments lunulate, often close and imbricate.

4. *B. Lunaria*.

Plants usually slender ; segments fan-shaped, distant.

5. *B. onondagense*.

Lamina usually stalked, entire to twice pinnately divided with cuneiform, oblong, or ovate segments.

Segments mostly cuneiform ; sporophyl erect in vernation.

6. *B. tenebrosum*.

Segments mostly oblong or ovate ; sporophyl with the tip bent down in vernation.

7. *B. neglectum*.

Lamina broadly deltoid, and, with the sporophyl, entirely bent down in vernation, sessile or nearly so.

8. *B. lanceolatum*.

Bud hairy.

Commonstalk mostly epigean ; bud only partly enclosed.

9. *B. virginianum*.

Commonstalk hypogean ; bud entirely enclosed.

Segments more or less deeply lacerate into linear often forked teeth.

11. *B. dissectum*.

Segments entire, crenulate or serrulate, not deeply divided.

Tips of the penultimate divisions elongate, much larger than the lateral segments.

10. *B. obliquum*.

Tips of the penultimate divisions ovate to deltoid or fan-shaped to reniform, usually about as broad as long, the lateral segments mostly similar in shape and size.

Segments mostly acute or acutish (northern and western North America).

- Plants usually rather large ; lamina 7-20 cm. long, 10-30 cm. broad.
 Lamina-stalk usually 5 cm. or more long ; plant not excessively fleshy, often very slender.
 Segments mostly 5-45 mm. long, 2-20 mm. broad, few smaller.
 Spores maturing from July to September.
 Segments mostly oblong to ovate, the margins crenulate or only coarsely serrulate. 12. *B. silaifolium*.
 Segments narrower, cuneiform, oblong or lanceolate, the outer margins mostly sharply and finely serrulate. 13. *B. decompositum*.
 Spores maturing from May to June ; segments mostly elliptic to rhombic, expanded ; plants lax. 14. *B. californicum*.
 Segments all small, 2-5 mm. long, 1-5 mm. broad. 15. *B. Schaffneri*.
 Lamina-stalk short, 1-4 cm. long ; plant very stout and fleshy. 16. *B. Coulteri*.
 Plants normally smaller ; lamina 2-4.5 cm. long, 3-7 cm. broad.
 Lamina-stalk not more than 2 cm. long. 17. *B. pusillum*.
 Lamina-stalk 2-8 cm. long. 18. *B. Matricariae*.
 Segments mostly rounded above, cuneiform to lunulate (southeastern United States and Jamaica).
 Spores maturing from February to April.
 Bud with a few scattered hairs ; lamina sessile or nearly so, the segments mostly fan-shaped (southern states). 19. *B. biternatum*.
 Bud densely hairy ; lamina stalked, the segments mostly oval or ovate (Jamaica). 20. *B. Jenmani*.
 Spores maturing from July to October.
 Plants slender, lax ; segments cuneiform to lunulate (southern states). 21. *B. alabamense*.
 Plants rather stout ; segments spatulate to ovate (Jamaica). 22. *B. Underwoodianum*.

1. *Botrychium simplex* Hitchc. Am. Jour. Sci. 6 : 103. 1823.

Botrychium Kannenbergii Klinsman, Bot. Zeit. 10 : 278. 1852.

Botrychium virginicum simplex A. Gray, Man. ed. 2. 602. 1856.

Plant slender, 2-20 cm. high ; rhizome slender, short ; bud smooth, entirely enclosed ; leaf erect, the commonstalk usually about half hypogean, often less, 1-5 cm. long, the lamina erect or slightly bent in vernation, stalked (0.2-2.5 cm.), deltoid or deltoid-ovate, rounded, 0.3-4 cm. long, 0.2-2.2 cm. broad, entire, incised to pinnately or sometimes subternately divided, the primary divisions oblong-ovate, entire to pinnately divided with broadly cuneiform to fan-shaped or lunulate, entire or radially incised, separated and often distant segments ; sporophyl long-stalked, often one-half to two-thirds the height of the plant, 0.6-16 cm. long, erect in vernation, the panicle lax.

TYPE LOCALITY : Conway, Massachusetts.

DISTRIBUTION : Nova Scotia to Pennsylvania, west to the Pacific coast ; also in Europe.

ILLUSTRATIONS : Am. Jour. Sci. 6 : *pl.* 8 ; Davenp. Notes Botrych. Simplex *pl.* 1 ; Nova Acta Acad. Leop.-Carol. 26 : *pl.* 49 ; D. C. Eaton, Ferns N. Am. *pl.* 17, *f.* 1-8 ; Britt. & Brown, Ill. Fl. *f.* 2.

2. *Botrychium pumicola* Coville ; Underw. Our Nat.

Ferns ed. 6. 69. 1900.

Plant stout, fleshy, 8-17 cm. high ; rhizome stout, erect, 2-7 cm. long, 1.5-3 mm. thick ; bud smooth, entirely enclosed ; leaf erect, the commonstalk hypogean, 3.3-7 cm. long, thickly sheathed for about half its length by the remains of dead fronds, the lamina with the apex bent down in vernation, glaucous-green, sessile, clasping, deltoid, rounded above, 0.5-4 cm. long, 0.5-4 cm. broad, once ternately divided, the divisions oblong or oblong-ovate, pinnately parted into cuneiform to lunulate, entire or radially incised, closely imbricated segments ; sporophyl 0.5-4.5 cm. long, erect in vernation, the panicle compact.

TYPE LOCALITY : Llao Rock, Crater Lake, Oregon, altitude 3600 meters.

DISTRIBUTION : Known only from the type locality.

ILLUSTRATION : Bull. Torrey Club 28 : *pl.* 7.

3. *Botrychium boreale* Milde, Bot. Zeit. 15: 880. 1857.

Botrychium crassinervium Rupr.; Milde, Nova Acta Acad. Leop.-Carol. 26: 763. 1858.

Plant usually stout, 6–19.5 cm. high; rhizome slender, erect; bud smooth, entirely enclosed; leaf erect, the commonstalk mostly epigean, 3–11 cm. high, the lamina with the apex bent down but not clasping the sporophyl in vernation, sessile, oblong-ovate to deltoid-ovate, 1.4–5.5 cm. long, 1.4–5.3 cm. broad, usually only once pinnately divided, the divisions close, fan-shaped to broadly rhombic or deltoid, acutely or obtusely cuneate below, acutish above, entire or incised, or rarely with the lowest divisions pinnately lobed with broad, oblong or ovate to rhombic lobes; sporophyl erect in vernation, 1.5–5.5 cm. long, usually exceeding the lamina very little, the panicle compact.

TYPE LOCALITY: Scandinavia.

DISTRIBUTION: Alaska; also in Europe.

ILLUSTRATIONS: Nova Acta Acad. Leop.-Carol. 26: *pl.* 55, *f.* 1, 2, 10, 11; D. C. Eaton, Ferns N. Am. *pl.* 5, *f.* 3.

4. *Botrychium Lunaria* (L.) Sw. Jour. Bot.

Schrad. 1800²: 110. 1801.

Osmunda Lunaria L. Sp. Pl. 1064. 1753.

Botrypus Lunaria Rich. in Marthe, Cat. Jard. Méd. Paris 120. 1801.

Plant usually stout, 3–27 cm. high; rhizome slender, erect; bud smooth, entirely enclosed; leaf erect, the commonstalk mostly epigean, 2–13 cm. long, the lamina with the apex bent down and clasping the sporophyl in vernation, sessile or nearly so, usually oblong, rarely ovate or deltoid-ovate, rounded above, 0.9–11 cm. long, 0.6–4.7 cm. broad, once pinnately divided, the divisions close, often imbricate, fan-shaped to lunulate or reniform, entire or radially incised or cleft, the lobes cuneiform; sporophyl with the apex bent down in vernation, often exceeding the lamina, 1–16 cm. long, the panicle often stout, 1–3 times divided.

TYPE LOCALITY: Europe.

DISTRIBUTION: Usually in open fields, Greenland to Vermont, west to Alaska and Colorado; also in Europe and Asia.

ILLUSTRATIONS: Bull. Torrey Club 30: 49. *f.* 3; Nova Acta Acad. Leop.-Carol. 26: *pl.* 48; D. C. Eaton, Ferns N. Am. *pl.* 5, *f.* 1; Britt. & Brown, Ill. Fl. *f.* 3.

5. *Botrychium onondagense* Underw. Bull. Torrey Club 30: 47. 1903.

Plant slender, 6–24 cm. high; rhizome slender, erect; bud smooth, entirely enclosed; leaf erect, the commonstalk mostly epigean, 4–12.5 cm. long, the lamina with the tip bent down and clasping the sporophyl in vernation, sessile or with a short stalk, oblong, rounded above, 1.4–8.2 cm. long, 0.9–2.3 cm. broad, once pinnately divided, the divisions distant, fan-shaped, entire or radially incised; sporophyl 2.8–11 cm. long, with the tip bent down in vernation, the panicle usually lax (scant), 1–2 times divided.

TYPE LOCALITY: Near Split Rock, Onondaga County, New York.

DISTRIBUTION: On cold wooded slopes, New York to Michigan and Montana; California (?).

ILLUSTRATION: Bull. Torrey Club 30: 49. *f.* 1, 2.

6. *Botrychium tenebrosum* A. A. Eaton, Fern Bull. 7: 8. 1899.

Plant slender, lax, 3–21.5 cm. high; rhizome slender, erect; bud smooth, entirely enclosed; leaf erect, the commonstalk mostly epigean, 2–10 cm. high, the lamina with the apex bent down in vernation, and with a stalk up to 4 cm. long, usually oblong, rarely deltoid, rounded at the apex, 0.2–5 cm. long, 0.2–3 cm. broad, entire to twice pinnately divided, the primary divisions distant, cuneiform to fan-shaped or lunulate, entire or incised or pinnatifid with cuneiform or sometimes fan-shaped or lunulate, entire or incised, rounded segments; sporophyl erect in vernation, 0.4–13 cm. long, the stalk usually much exceeding the lamina, the panicle very slender; spores finely verrucose, .04–.05 mm. thick.

TYPE LOCALITY: Rockingham County, New Hampshire.

DISTRIBUTION: New England, New York, and Pennsylvania.

ILLUSTRATION: Bull. Torrey Club 30: 49. *f.* 6, 7.

7. **Botrychium neglectum** Wood, Class Book ed. 2. 816. 1847.

Botrychium matricariaefolium Milde, Verh. Zool.-Bot. Ges. Wien 19: 123, in part. 1869. Not *B. matricariaefolium* A. Br. 1843.

Plant 6-32 cm. high; rhizome slender, erect; bud smooth, entirely enclosed; leaf erect, the commonstalk mostly epigean, 4-20 cm. high, the lamina with the upper part bent down in vernation, with a stalk 0.2-1.7 cm. long, usually oblong, rarely deltoid, acutish, 0.5-7 cm. long, 0.4-3.7 cm. broad, 1-3 times pinnately divided, the primary divisions oblong or ovate, the segments mostly oblong, blunt, entire or incised; sporophyl with the upper part bent down in vernation, 2-14 cm. long, the stalk often equaling or exceeding the lamina, the panicle usually diffuse; spores coarsely verrucose, .03-.04 mm. thick.

TYPE LOCALITY: Meriden, New Hampshire.

DISTRIBUTION: Nova Scotia to Pennsylvania, west to Ohio and Saskatchewan; also in Europe.

ILLUSTRATIONS: Bull. Torrey Club 30: 49. f. 4, 5; Hook. & Grev. Ic. Fil. pl. 82 (as *B. simplex*, left hand figure only); D. C. Eaton, Ferns N. Am. pl. 17, f. 9-12 (as *B. matricariaefolium*); Britt. & Brown, Ill. Fl. f. 4 (as *B. matricariaefolium*).

8. **Botrychium lanceolatum** (S. G. Gmel.) Ångstr. Bot.

Notiser 1854: 68. 1854.

Osmunda lanceolata S. G. Gmel. Nov. Comm. Acad. Petrop. 12: 516. 1768.

Botrychium palmatum Presl, Abh. Böhm. Ges. Wiss. V. 4: 303. 1845.

Plant 5-32 cm. high; rhizome slender, erect; bud smooth, entirely enclosed; leaf erect, the commonstalk mostly epigean, 2.7-25 cm. long, the lamina wholly bent down in vernation, sessile or nearly so, broadly deltoid, acute, 1-6 cm. long, 0.8-9 cm. broad, 1-2 times pinnately or even subternately divided, the primary divisions linear-lanceolate to ovate or oblong, entire, incised or pinnatifid, with linear-lanceolate to ovate-lanceolate, entire or incised segments; sporophyl wholly bent down in vernation, 0.8-8 cm. long, with a stalk rarely equaling the lamina, the panicle rather diffuse.

TYPE LOCALITY: Europe.

DISTRIBUTION: Greenland and Nova Scotia to Pennsylvania, west to Colorado, Washington, and Alaska; also in Europe and Asia.

ILLUSTRATIONS: S. G. Gmel. loc. cit. pl. 11, f. 2; Fl. Dan. pl. 18 (right hand figure only); D. C. Eaton, Ferns N. Am. pl. 5, f. 2; Britt. & Brown, Ill. Fl. f. 6.

9. **Botrychium virginianum** (L.) Sw. Jour. Bot.

Schrad. 1800³: 111. 1801.

Osmunda virginiana L. Sp. Pl. 1064. 1753.

Botrychium virginicum Willd. Sp. Pl. 5: 64. 1810.

Botrychium gracile Pursh, Fl. Am. Sept. 656. 1814.

Botrychium virginicum mexicanum Grev. & Hook. Bot. Misc. 3: 223. 1833.

Botrychium brachystachys Kunze, Linnaea 18: 305. 1844.

Botrychium anthemoides Presl, Abh. Böhm. Ges. Wiss. V. 5: 323. 1847.

Botrychium dichronum Underw. Bull. Torrey Club 30: 45. 1903.

Plant rather slender, 8-80 cm. high; rhizome erect, rather stout; bud hairy, only partly enclosed; leaf erect, the commonstalk mostly epigean, 5-49 cm. high, the lamina ample, wholly bent down in vernation, thin and membranous when dry, sessile, broadly deltoid, acute or obtuse, 2.5-35 cm. long, 4-42 cm. broad, 3-5 times divided, the primary divisions lanceolate, oblong or elliptic to ovate or rhombic, the penultimate divisions narrowly oblong or lanceolate to ovate or even deltoid, pinnately divided, the segments oblong, blunt, incised; sporophyl usually long-stalked, often as much as half the height of the plant, the panicle usually slender and not compact.

TYPE LOCALITY: Virginia.

DISTRIBUTION: Maine to British Columbia and southward throughout the United States to Mexico and the West Indies; also in Europe and Asia.

ILLUSTRATIONS: D. C. Eaton, Ferns N. Am. pl. 33; Britt. & Brown, Ill. Fl. f. 7.

10. **Botrychium obliquum** Muhl.; Willd. Sp. Pl. 5: 62. 1810.

Botrychium cuneatum Desv. Mém. Soc. Linn. Paris 6: 195. 1827.

Botrychium tenuifolium Underwood, Bull. Torrey Club 30: 52. 1903.

Sceptridium obliquum Lyon, Bot. Gaz. 40: 458. 1905.

Sceptridium tenuifolium Lyon, Bot. Gaz. 40: 458. 1905.

Plant 8-50 cm. high, often fleshy, the rhizome horizontal or ascending, the main roots fleshy-fibrous, 2-3 mm. thick, with finer fibrous branches; bud hairy, entirely enclosed;

commonstalk short, hypogean ; lamina with a stalk 2-13 cm. long, ovate-deltoid to broadly pentagonal, acuminate, 2.5-14 cm. long, 3.5-18 cm. broad, pinnately or subternately divided two to nearly four times, the primary divisions lanceolate or oblong-lanceolate to deltoid, decurrent, sessile or stalked, acute or acuminate, the secondary divisions mostly lanceolate, the penultimate divisions mostly lanceolate, pinnately divided in the lower half or two-thirds into obliquely lunulate to ovate or ovate-lanceolate, sessile or stalked, lateral segments, and terminating in elongate, lanceolate or oblong-lanceolate tips, the margins of the segments finely crenulate or serrulate ; sporophyl 6-45 cm. long, the stalk 4-33 cm. long, the panicle lax or rather compact, 3 or 4 times divided.

TYPE LOCALITY: Pennsylvania.

DISTRIBUTION: New Hampshire to Wisconsin, south to Georgia and Arkansas; also in Jamaica.

ILLUSTRATIONS: D. C. Eaton, Ferns N. Am. *pl.* 20, *f.* 2, 10; Britt. & Brown, Ill. Fl. *f.* 5 (as *B. ternatum*).

11. *Botrychium dissectum* Spreng. Anleit. 3: 172. 1804.

Sceptridium dissectum Lyon, Bot. Gaz. 40: 457. 1905.

Plant 10-50 cm. high; bud hairy, entirely enclosed; commonstalk hypogean, 0.6-6 cm. long; lamina with a stalk 2.5-12.5 cm. long, broadly deltoid, 2.3-18 cm. long, 3-20 cm. broad, pinnately or subternately divided, the primary divisions lanceolate to deltoid, the lower stalked, the margins of the segments more or less lacerate into narrowly oblong to linear, often forked teeth; sporophyl 9-45 cm. long, with a stalk 7-30 cm. long, the panicle lax, 3 or 4 times divided.

TYPE LOCALITY: Virginia.

DISTRIBUTION: New England to Indiana, south to Kentucky and Virginia.

ILLUSTRATION: D. C. Eaton, Ferns N. Am. *pl.* 20, *f.* 1, 9.

12. *Botrychium silaifolium* Presl, Rel. Haenk. 1: 76. 1825.

Botrychium rutaefolium robustum Rupr.; Milde, Nova Acta Acad. Leop.-Carol. 26: 763. 1858.

Botrychium occidentale Underw. Bull. Torrey Club 25: 538. 1898.

Botrychium obliquum intermedium Underw. Our Nat. Ferns ed. 6. 72. 1900.

Botrychium robustum Underw. Bull. Torrey Club 30: 51. 1903.

Sceptridium silaifolium Lyon, Bot. Gaz. 40: 458. 1905.

Sceptridium robustum Lyon, Bot. Gaz. 40: 458. 1905.

Plant 10-50 cm. high, rather stout, strict; bud hairy, entirely enclosed; commonstalk short, hypogean; lamina with a stalk 3-15 cm. long, broadly deltoid to pentagonal, acute or obtuse, 5-20 cm. long, 7-30 cm. broad, 3-4 times pinnately or subternately divided, the primary divisions oblong or oblong-lanceolate to deltoid or pentagonal, the penultimate divisions oblong-lanceolate, pinnately divided into 2-5 pairs of oblique, oblong, narrowly elliptic or sometimes ovate, decurrent, lateral segments, and broader, rhomboid tips, the margins of the segments crenulate; sporophyl 8-45 cm. long, the panicle diffuse; spores maturing from July to September.

TYPE LOCALITY: Nootka Sound, British Columbia.

DISTRIBUTION: Maine and New York to Wisconsin, west to Alaska and northern California.

ILLUSTRATION: D. C. Eaton, Ferns N. Am. *pl.* 20a (anterior and middle figures).

13. *Botrychium decompositum* Mart. & Gal. Mém. Acad.

Brux. II. 15^o: 15. 1842.

Sceptridium decompositum Lyon, Bot. Gaz. 40: 457. 1905.

Plant 32-50 cm. high or more, slender, strict; bud hairy, entirely enclosed; commonstalk rather short, hypogean; lamina with a stalk 6.5-19 cm. long, deltoid or pentagonal, 7-19 cm. long, 7-23 cm. broad, 3-4 times pinnately or subternately divided, the primary divisions lanceolate to deltoid, the penultimate divisions lanceolate, pinnately divided into 2-6 pairs of oblique, lanceolate to ovate-lanceolate or sometimes ovate, lateral segments, and a similarly shaped tip, the margins of the segments distinctly sharply serrulate; sporophyl 25-45 cm. high, the panicle diffuse; spores maturing from August to September.

TYPE LOCALITY: Mexico.

DISTRIBUTION: Mexico and Guatemala.

ILLUSTRATION: Mart. & Gal. *loc. cit.* *pl.* 1.

14. **Botrychium californicum** Underw. *Torrey Club* 5 : 107. 1905.

Botrychium silaifolium Underw. *Bull. Torrey Club* 30 : 51. 1903. Not *B. silaifolium* Presl, 1825.
Sceptridium californicum Lyon, *Bot. Gaz.* 40 : 457. 1905.

Plant 32–65 cm. high, lax; bud hairy, entirely enclosed; commonstalk rather short; lamina with a stalk 7–15 cm. long, more or less deltoid, but usually irregular in outline, drooping, acute or obtuse, 10–28 cm. long, 11–40 cm. broad, 4–6 times pinnately or subternately divided, the primary divisions oblong to deltoid, the penultimate divisions oblong, pinnately divided into 1–3 pairs of broad, oblique, ovate to rhombic, mostly acute, lateral segments, and acute, rhomboid tips, the outer margins of the segments entire or bluntly serrulate; sporophyl 28–60 cm. long, the panicle diffuse; spores maturing from May to June.

TYPE LOCALITY: Quincy, Plumas County, California.

DISTRIBUTION: California.

ILLUSTRATION: D. C. Eaton, *Ferns N. Am. pl. 20a* (posterior figure).

15. **Botrychium Schaffneri** Underw. *Bull. Torrey Club* 30 : 51. 1903.

Sceptridium Schaffneri Lyon, *Bot. Gaz.* 40 : 458. 1905.

Plant 32–43 cm. high, rather fleshy, strict; bud hairy, entirely enclosed; commonstalk short, hypogean; lamina with a stalk 4.5–11 cm. long, broadly deltoid to pentagonal, obtuse, 3–14.5 cm. long, 5–20 cm. broad, 4–6 times pinnately or subternately divided, the primary divisions crowded and imbricate, lanceolate to deltoid, the penultimate divisions lanceolate or ovate-lanceolate, pinnately divided into very small, oblique, oblong to ovate, lateral segments, and rhomboid tips, the margins of the segments entire or notched; sporophyl 28–39 cm. high, the panicle usually rather compact.

TYPE LOCALITY: Near San Luis Potosi.

DISTRIBUTION: San Luis Potosi and Valley of Mexico.

16. **Botrychium Coulteri** Underw. *Bull. Torrey Club* 25 : 537. 1898.

Sceptridium Coulteri Lyon, *Bot. Gaz.* 40 : 457. 1905.

Plant 14–27 cm. high, very stout and fleshy in all parts, strict; bud hairy, entirely enclosed; commonstalk short, hypogean; lamina with a stalk 1.5–4 cm. long, broadly deltoid to pentagonal, obtuse, 6–14 cm. long, 8.5–20 cm. broad, about 4 times pinnately or subternately divided, the primary divisions crowded and imbricate, oblong to deltoid, the penultimate divisions oblong, pinnately divided into 2–5 pairs of oblique, broadly oblong or ovate, mostly acute or acutish lateral segments, and ovate to rhomboid, acutish tips, the margins of the segments entire or undulate; sporophyl 11–22.5 cm. high, the panicle short and compact; spores maturing from August to September.

TYPE LOCALITY: Yellowstone National Park.

DISTRIBUTION: Montana and Wyoming to Oregon.

17. **Botrychium pusillum** Underw. *Bull. Torrey Club* 30 : 50. 1903.

Sceptridium pusillum Lyon, *Bot. Gaz.* 40 : 458. 1905.

Plant 6–11 cm. high, fleshy, the rhizome ascending; bud hairy, entirely enclosed; commonstalk short, hypogean; lamina with a stalk 1–2 cm. long, broadly deltoid to pentagonal, obtuse, 2–3 cm. long, 3–5 cm. broad, about 3 times pinnately or subternately divided, the primary divisions oblong or lanceolate to deltoid or pentagonal, the penultimate divisions oblong or lanceolate, pinnately divided into small crowded, often imbricate, oblique, oblong or ovate, rounded or acute, somewhat fleshy lateral segments, and broader, rhomboid tips, the margins of the segments entire or barely crenulate; sporophyl 3.5–8 cm. long, the stalk 2.5–5 cm. long, the panicle about twice divided, with crowded sporangia; spores maturing from September to October.

TYPE LOCALITY: Sierra de las Cruces, State of Mexico, altitude 3000 meters.

DISTRIBUTION: Known only from the type collection.

18. *Botrychium Matricariae* (Schränk) Spreng. Syst.

Veg. 4: 23. 1827.

Osmunda Matricariae Schrank, Baier. Fl. 2: 419. 1789.*Botrychium rutaceum* Sw. Jour. Bot. Schrad. 1800²: 110. 1801.*Botrychium matricarioides* Willd. Sp. Pl. 5: 62. 1810.*Botrychium rutaefolium* A. Br.; Döll, Rhein. Fl. 24. 1843.*Botrychium Breynii* Fries, Summa Veg. Scand. 252. 1846.*Sceptridium Matricariae* Lyon, Bot. Gaz. 40: 458. 1905.

Plant 5–25 cm. high, the rhizome erect; bud hairy, entirely enclosed; commonstalk short, hypogean; lamina with a stalk usually more than 2 cm. long (1–5.5), broadly deltoid or pentagonal, acute or obtuse, 1.3–5 cm. long, 1.8–7 cm. broad, 3–4 times pinnately or subternately divided, the primary divisions ovate-lanceolate to deltoid or pentagonal, the penultimate divisions ovate-lanceolate to deltoid-ovate, pinnately divided into crowded, oblique, ovate, acute lateral segments, and broader rhomboid tips, the margins of the segments entire or finely crenulate; sporophyl 5.5–21 cm. long, the stalk 4.7–16.5 cm. long, the panicle usually compact; spores maturing about September.

TYPE LOCALITY: Germany.

DISTRIBUTION: Nova Scotia and Quebec to Vermont and Wisconsin; also in Europe.

ILLUSTRATION: Nova Acta Acad. Leop.-Carol. 26: pl. 53, f. 198.

19. *Botrychium biternatum* (Savigny) Underw. Bot.

Gaz. 22: 407. 1896.

Osmunda biternata Savigny, in Lam. Encyc. 4: 650. 1797.*Botrypus lunaroides* Michx. Fl. Bor. Am. 2: 274. 1803.*Botrychium lunaroides* Sw. Syn. Fil. 172. 1806.*Botrychium fumaroides* Willd. Sp. Pl. 5: 63. 1810.*Botrychium Fumariae* Spreng. Syst. Veg. 4: 23. 1827.*Sceptridium biternatum* Lyon, Bot. Gaz. 40: 457. 1905.

Plant 8–12 cm. high, the rhizome erect, short and stout; bud with a few scattered hairs, entirely enclosed; commonstalk short, hypogean; lamina lax, sessile or nearly so, broadly deltoid or pentagonal, obtuse, 3–6 cm. long, 5–9 cm. broad, two or three times pinnately or subternately divided, the lowest primary divisions deltoid, the upper ones mostly oblong or oblong-ovate, the penultimate divisions oblong or oblong-ovate, pinnately divided into fan-shaped to lunulate or reniform, mostly sessile, usually close, oblique lateral segments, and somewhat larger, similarly shaped terminal segments, the outer margins of the segments finely serrulate; sporophyl 6–10 cm. long, the stalk 4.5–9 cm. long, the panicle rather lax; spores maturing from February to April.

TYPE LOCALITY: South Carolina.

DISTRIBUTION: South Carolina to Florida and Louisiana.

ILLUSTRATIONS: Bot. Gaz. 22: pl. 21; D. C. Eaton, Ferns N. Am. pl. 20, f. 3, 8.

20. *Botrychium Jenmani* Underw. Fern Bull. 8: 59. 1900.*Sceptridium Jenmani* Lyon, Bot. Gaz. 40: 457. 1905.

Plant 5–33 cm. high, usually lax and slender, the rhizome mostly erect; bud densely clothed with fine silky white hairs, entirely enclosed; commonstalk short, hypogean; lamina with a stalk 0.5–6 cm. long, deltoid to broadly pentagonal, acute or obtuse, 1.5–9.5 cm. long, 2.5–13 cm. broad, 2–4 times pinnately or subternately divided, the lowest primary divisions deltoid or somewhat pentagonal, often long-stalked, the upper ones oblong to oblong-ovate, the penultimate divisions oblong or oblong-ovate, pinnately divided into 2–4 cuneiform to oblong or oblong-ovate, mostly rounded, sessile, distant or close lateral segments, and larger, unequally fan-shaped to rhombic, rounded or acutish tips, the outer margins of the segments finely serrulate; sporophyl 4.5–30 cm. long, the stalk 3.8–25 cm. long, the panicle lax; spores maturing from February to April.

TYPE LOCALITY: Cinchona, Jamaica, altitude 1500 meters.

DISTRIBUTION: Blue Mountains, Jamaica.

21. *Botrychium alabamense* Maxon, Proc. Biol. Soc.

Wash. 19: 23. 1906.

Plant 7–38 cm. high, lax and slender, the rhizome mostly erect; bud hairy, entirely enclosed; commonstalk short, hypogean; lamina lax, with a stalk 1.5–11 cm. long, broadly

deltoid, rhombic or pentagonal, acute or obtuse, 4.5–21 cm. long, 7–22 cm. broad, two or three times pinnately or subternately divided, with distant, often long-stalked primary divisions, the lowest deltoid to pentagonal, the upper ones oblong or lanceolate to deltoid, the penultimate divisions lanceolate or oblong to oblong-ovate, pinnately divided into two to six cuneiform to fan-shaped, or ovate to orbicular, mostly sessile, usually distant, oblique lateral segments, and somewhat larger, similarly shaped tips, the outer margins finely serrulate; sporophyl 6–33 cm. long, the stalk 4–27 cm. long, the panicle lax; spores maturing in September.

TYPE LOCALITY: Spring Hill, Alabama.

DISTRIBUTION: Alabama and Georgia.

22. *Botrychium Underwoodianum* Maxon, Bull. Torrey Club 32: 220. 1905.

Sceptridium Underwoodianum Lyon, Bot. Gaz. 40: 458. 1905.

Plant 17–46 cm. high, the rhizome erect; bud densely hairy, entirely enclosed; commonstalk short, hypogean; lamina not lax, with a stalk 3.5–20 cm. long, broadly pentagonal or deltoid, acute or obtuse with a rounded apex, 5–18 cm. long, 6.5–21.5 cm. broad, 3 or 4 times pinnately or subternately divided, the lowest primary divisions deltoid or pentagonal, the others mostly oblong to lanceolate, the penultimate divisions oblong to lanceolate, pinnately divided into large, mostly oblong or oval, sometimes ovate, rounded, mostly separated, oblique lateral segments, and broad, rounded, somewhat rhombic tips, the outer margins of the segments finely serrulate; sporophyl 15–40 cm. long, the stalk 11.5–26.5 cm. long, the panicle rather close; spores maturing from August to September.

TYPE LOCALITY: Jamaica.

DISTRIBUTION: Blue Mountains, Jamaica; Haïti (?).

ILLUSTRATION: Bull. Torrey Club 32: pl. 6.

DOUBTFUL SPECIES

Botrychium cicutarium Sw. Syn. Fil. 171. 1806. Based on Plumier, *Traité Foug.* 159, from Santo Domingo. Not identifiable with any known material.

2. *OPHIOGLOSSUM* L. Sp. Pl. 1062. 1753.

Low terrestrial plants. Rhizomes hypogean, small, usually erect, sometimes producing suckers, the apex naked, or covered only with the bases of old leaves. Leaves erect in vernal, conduplicate, glabrous, one to four, herbaceous and fleshy, consisting of a usually short commonstalk, an entire linear-lanceolate or elliptic to reniform lamina, and a single erect sporophyl; venation reticulate, the areolae simple or with included free and anastomosing veinlets; sporophyl a slender, usually long-pedunculate spike, consisting of two rows of large, discoid or globose, coalescent, transversely dehiscent, sporangia. Spores reticulately marked, pitted, often verrucose.

Type species, *Ophioglossum vulgatum* L.

Lamina deltoid-ovate to cordate or reniform, the base truncate or auriculate, rarely obtuse.

Rhizome cylindric; roots about 1 mm. thick; spike rather slender.

Plants mostly more than 16 cm. high (13–36); lamina auriculate. 1. *O. reticulatum*.

Plants mostly less than 12 cm. high (4.5–18); lamina truncate. 2. *O. Harrisii*.

Rhizome globose; roots less than 0.5 mm. thick; spike short and stout. 3. *O. crotalophoroides*.
Lamina lanceolate or spatulate to ovate, rarely broader, the base acute, obtuse or rounded.

Plants normally small, usually less than 9 cm. high (1.5–11.5).

Median vein emitting one or two veins; areolae mostly divergent; lamina usually plane and horizontal, $\frac{1}{6}$ – $\frac{1}{4}$ the height of the plant. 4. *O. tenerum*.

Median vein simple, except for connecting veinlets; areolae mostly parallel; lamina usually folded, ascending, $\frac{1}{4}$ – $\frac{1}{2}$ the height of the plant. 5. *O. californicum*.

Plants larger, usually more than 12 cm. high (6–40).

Lamina lanceolate to ovate, spatulate, elliptic or oblong, the apex round or sometimes acute, not apiculate; spores reticulate with thin raised ridges. 6. *O. vulgatum*.

Lamina elliptic or rarely ovate, usually acute, apiculate; spores pitted. 7. *O. Engelmanni*.

1. *Ophioglossum reticulatum* L. Sp. Pl. 1063. 1753.

Plant 13–36 cm. high; rhizome cylindric, 0.7–20 mm. long, 3–5 mm. thick; roots fleshy-fibrous, persistent, mostly 1 mm. thick; leaves usually solitary, sometimes two; commonstalk 3–15 cm. long, usually mostly epigean; lamina usually short-stalked, somewhat folded below, nearly horizontal, deltoid-ovate to reniform, auriculate or rarely truncate, acute, obtuse or rounded above, sometimes apiculate, 2.5–10 cm. long, 2–6.8 cm. broad; areolae mostly compound with few to many free or anastomosing included veinlets; sporophyl 6.5–26 cm. long, the spike slender, 1.8–6.5 cm. long, 1.5–3 mm. thick, more or less apiculate; sporangia 18–60-jugate; spores .03–.04 mm. thick, finely pitted or reticulate, the areolae about 20 to the semicircumference, the ridges finely verrucose.

TYPE LOCALITY: Near Léogane, Haïti.

DISTRIBUTION: Pan-tropic; altitude 500–800 meters.

ILLUSTRATIONS: Plumier, *Traité Foug.* *pl.* 164; Hook. & Grev. *Ic. Fil.* *pl.* 20; Jahrb. Bot. Gart. Berlin 3: *pl.* 8, *f.* 32.

2. *Ophioglossum Harrisii* Underwood, sp. nov.

Plant 4.5–18 cm. high, reproducing by suckers; rhizome stout, cylindric, 5–13 mm. long by 3.5–5 mm. thick; leaves usually solitary, sometimes two or even three; commonstalk 1.7–9.5 cm. long, usually half or more hypogean; lamina sessile, folded, usually horizontal, deltoid to deltoid-reniform or suborbicular, truncate or sometimes obtuse below, acute, obtuse or rounded above, usually apiculate, 1.5–3.5 cm. long, 1.3–2.3 cm. broad, the areolae simple or with a few included veinlets; sporophyl 2.2–11.5 cm. long, the spike rather stout, 0.7–2.5 cm. long, 1.3–3 mm. thick, apiculate; sporangia 10–35-jugate; spores as in *O. reticulatum* finely pitted, .035–.04 mm. in diameter.

Type collected near Cinchona, Jamaica, altitude 1600 meters, January 30, 1903, *Underwood 169* (herb. N. Y. Bot. Gard.).

DISTRIBUTION: Mountains of Jamaica, at an altitude of from 1000–1600 meters, usually in cleared land.

3. *Ophioglossum crotalophoroides* Walt. Fl. Car. 256. 1788.

Ophioglossum bulbosum Michx. Fl. Bor. Am. 2: 276. 1803.

Ophioglossum tuberosum H. & A. Bot. Beech. Voy. 53. 1832.

Ophioglossum stipitatum Colla, Mem. Accad. Torino 39: 52. 1836.

Plant 1.5–13.5 cm. high; rhizome globose, 0.5–1 cm. thick; roots few, hairlike, less than 0.5 mm. thick; leaves two to four; commonstalk short, 0.8–3.5 cm. long, mostly hypogean; lamina nearly horizontal, somewhat folded below, usually cordate, short-stalked, acute or obtuse with a short acuminate or even apiculate apex, rarely deltoid-ovate or ovate and truncate or obtuse below, 1.1–4 cm. long, 0.7–2.2 cm. broad, the basal veins 5–7, the median vein slightly the largest, emitting 1 or 2 branches, the areolae simple or with few included veinlets; sporophyl 1.3–10 cm. long, the spike stout, 3–14 mm. long, 2–5 mm. thick, often long-apiculate; sporangia 3–14-jugate; spores .04–.05 mm. thick, reticulate or pitted, the areolae about 15 to the semicircumference, the ridges verrucose.

TYPE LOCALITY: South Carolina.

DISTRIBUTION: South Carolina to Texas, and from Mexico to Argentina and Chile.

ILLUSTRATIONS: D. C. Eaton, *Ferns N. Am.* *pl.* 81, *f.* 5–7; Jahrb. Bot. Gart. Berlin 3: *pl.* 8, *f.* 25.

4. *Ophioglossum tenerum* Mett.; Prantl, Ber. Deuts.

Bot. Ges. 1: 352. 1883.

Ophioglossum pusillum Nutt. Gen. 2: 248. 1818. Not *O. pusillum* Raf. 1814.

Plant 1.5–10 cm. high, often in sand; rhizome stout, cylindric or globose, 2–5 mm. long, 1.8–5 mm. thick; roots persistent, fibrous, about 0.5 mm. thick; leaves usually two (1–4); commonstalk 0.1–2 cm. long, hypogean; lamina sessile or short-stalked, mostly plane and nearly horizontal, elliptic to broadly ovate, acute or obtuse below, acute above, usually not apiculate, 0.4–2 cm. long, 0.2–0.9 cm. broad, the basal veins 3–5, the median vein slightly the strongest, emitting one or two branches, the areolae divergent from the median vein, mostly small, short and broad, the largest with several free and anastomosing included veinlets; sporophyl slender, 1.5–8 cm. long, the spike rather slender, 2–12 mm.

long, 1-2 mm. thick, apiculate; sporangia 2-18-jugate; spores .03-.04 mm. thick, finely pitted and verrucose.

TYPE LOCALITY: Near Savannah, Georgia.

DISTRIBUTION: South Carolina to Louisiana; Cuba.

ILLUSTRATIONS: Jahrb. Bot. Gart. Berlin 3: *pl. 8, f. 23*; Bull. Torrey Club 24: *pl. 319, f. 7*; D. C. Eaton, Ferns N. Am. *pl. 81, f. 8-10*.

5. *Ophioglossum californicum* Prantl, Ber. Deuts. Bot.

Ges. 1: 351. 1883.

Plant 2.5-11.5 cm. high; rhizome stout, cylindric, 2-17 mm. long, 2-3 mm. thick; roots usually numerous, fibrous and somewhat fleshy, persistent, 0.5-1 mm. thick; leaves usually 2 (1-3); commonstalk 0.3-2.6 cm. long, hypogean; lamina folded, sessile or short-stalked, usually upwardly inclined, elliptic or oval, acute, often apiculate, 1.5-4.2 cm. long, 0.3-0.9 cm. broad, the basal veins 3-7, the median vein about equal to the others, free except for secondary interconnecting veinlets, the areolae mostly parallel to the median vein, narrow, simple or with a few included veinlets; sporophyl 1.4-9 cm. long, the spike 6.5-20 mm. long, 1-3 mm. thick, apiculate; sporangia 9-17-jugate; spores finely pitted, .045-.05 mm. in diameter, finely pitted when young, later verrucose.

TYPE LOCALITY: San Diego, California.

DISTRIBUTION: Southern California to Mexico.

ILLUSTRATIONS: Jahrb. Bot. Gart. Berlin 3: *pl. 7, f. 11*; Bull. Torrey Club 24: *pl. 319, f. 4*.

6. *Ophioglossum vulgatum* L. Sp. Pl. 1062. 1753.

Ophioglossum pusillum Raf. Jour. de Bot. Desv. II. 4: 273. 1814.

Ophioglossum arenarium E. G. Britton, Bull. Torrey Club 24: 555. *pl. 318; 319, f. 3*. 1897.

Ophioglossum alaskanum E. G. Britton, Bull. Torrey Club 24: 556. *pl. 319, f. 5*. 1897.

Plant 6-26 cm. high; rhizome cylindric or fusiform, 4-15 mm. long, 1.5-4 mm. thick; roots numerous, persistent, fleshy-fibrous, 0.5-1 mm. thick; leaves usually one, rarely two; commonstalk 4-21 cm. long, mostly epigean; lamina usually sessile, plane, upwardly inclined, lanceolate, ovate, oblong, elliptic or spatulate, acute, obtuse or rounded below, blunt or rounded above, rarely acute, translucent when dry, 1.5-12 cm. long, 0.7-5 cm. broad, the basal veins 7-11, about equal in size, the median vein simple except for secondary connecting veinlets, or rarely with one or two branches, the areolae small and indefinite, simple or with few-many included veinlets; sporophyl 3-27 cm. long, the spike 8-40 mm. long, 1.5-3.5 mm. thick, apiculate; sporangia 7-52-jugate; spores .03-.05 mm. in diameter, reticulate, rather coarsely pitted, verrucose, the pits angular, 6-12 to the semicircumference.

TYPE LOCALITY: Europe.

DISTRIBUTION: Maine and Quebec to Alaska, south to Texas (and Mexico?).

ILLUSTRATIONS: D. C. Eaton, Ferns N. Am. *pl. 81, f. 1-4*; Bull. Torrey Club 24: *pl. 319, f. 1*; Jahrb. Bot. Gart. Berlin 3: *pl. 7, f. 16*.

7. *Ophioglossum Engelmanni* Prantl, Ber. Deuts. Bot.

Ges. 1: 351. 1883.

Plant 6-25 cm. high; rhizome cylindric, 5-18 mm. long, 2-4 mm. thick; roots numerous, persistent, fibrous, somewhat fleshy, mostly less than 1 mm. thick; leaves one or often two; commonstalk about half hypogean, 2.5-10 cm. long; lamina sessile, with clasping base, upwardly inclined, elliptic or sometimes ovate-lanceolate or ovate, acutely cuneate below, the apex acute or rarely obtuse or rounded, apiculate, 1.8-10 cm. long, 0.9-3 cm. broad, the basal veins 7-13, the median slightly the largest, simple except for secondary connecting veinlets, the areolae mostly large with many free and anastomosing included veinlets; sporophyl 6-13 cm. long, the spike 13-35 mm. long, 2-3 mm. thick, apiculate; sporangia 10-32-jugate; spores .04-.05 mm. in diameter, very finely pitted and faintly verrucose, the pits rounded, 20-30 to the semicircumference.

TYPE LOCALITY: Comanche Spring, Texas.

DISTRIBUTION: Virginia and Indiana to Mexico.

ILLUSTRATIONS: Jahrb. Bot. Gart. Berlin 3: *pl. 7, f. 17*; Bull. Torrey Club 24: *pl. 319, f. 2*.

DOUBTFUL SPECIES

Ophioglossum pubescens Raf. Jour. de Bot. Desv. II. 4: 273. 1814. Not identifiable; no pubescent *Ophioglossum* is known.

3. **CHEIROGLOSSA** Presl, Abh. Böhm. Ges. Wiss.
V. 4: 316. 1845.

Epiphytic plants. Rhizomes stout, scaly; roots fleshy, fibrous. Leaves pendent or spreading, one to several, consisting of a long commonstalk, a broad palmately divided lamina, and one to several simple short-stalked pendent sporophylls borne along the upper part of the common stalk and the base of the lamina; venation anastomosing, with elongate major areolae and included free and anastomosing veinlets. Sporangia discoid, coalescent. Spores finely sculptured.

Type species, *Ophioglossum palmatum* L.

1. **Cheiroglossa palmata** (L.) Presl, Abh. Böhm. Ges.
Wiss. V. 4: 317. 1845.

Ophioglossum palmatum L. Sp. Pl. 1062. 1753.

Rhizome 8–25 mm. long, 8–15 mm. thick, clothed with fine, pale, hairlike scales; leaves 20–30 cm. long, spreading and pendent, the commonstalk 6–20 cm. long, flattened, the lamina obdeltoid, 10–20 cm. long, 5–25 cm. broad, digitately divided often nearly to the base into 2–10 tapering lobes 2–22 cm. long, rarely simple; venation reticulate, the major areolae elongate, angular, irregularly hexagonal, usually including several smaller areolae and an occasional free veinlet; sporophylls 1–16 on each leaf, 1–7 cm. long, borne along the margins of the upper part of the commonstalk and the base of the lamina; sporangia 8–60-jugate; spores yellow, .045–.06 mm. thick, very finely pitted and verrucose.

TYPE LOCALITY: Santo Domingo.

DISTRIBUTION: Epiphytic; from southeastern Florida throughout the West Indies to Mexico and Brazil.

ILLUSTRATIONS: Plumier, *Traité Foug.* pl. 163; D. C. Eaton, *Ferns N. Am.* pl. 81, f. 11–14.

Order **MARATTIALES**

BY LUCIEN MARCUS UNDERWOOD

Sporophytes with more or less tuberous or fleshy, often very stout, tough rootstocks, soft fleshy roots, and coarse, cespitose, usually more or less pinnately divided, stipulate, articulate leaves with circinnate vernation. Sporangia abaxial, developed from a group of epidermal and subepidermal cells (eusporangiate), separate or (as in all the American species) coalescent ($6-\infty$), forming 2-rowed or circular synangia, exannulate, opening by terminal pores or longitudinal slits. Spores uniform (homosporous), diplanate or triplanate, ephemeral.

Gametophytes (prothallia) green, flat.

(A single family :)

Fam. 1. MARATTIACEAE.

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Family 1. MARATTIACEAE

BY LUCIEN MARCUS UNDERWOOD¹

Characters of the order.

Rootstock horizontal; leaves dimorphic, once-pinnate or simple; synangia immersed, 20-∞-locular, almost completely covering the backs of the pinnae. 1. DANAEA.
Rootstock erect; leaves alike, 2-4-pinnate; synangia superficial, 6-18-locular, in a submarginal row. 2. MARATTIA.

1. DANAEA Smith, Mém. Acad. Turin 5: 420. 1793.

Coarse plants with creeping horizontal rhizomes, and dimorphic, once-pinnate or simple, stipulate leaves arranged in two rows along the upper portion of the rhizome. Leaf-axes swollen (nodose) at the insertion of the opposite pinnae, the lower nodes often with reduced pinnae or pinnae wanting ("stipes nodose"); venation free, simple or forking. Sporangia in two rows, opening by terminal pores, coalescent to form linear immersed, pluri-locular (20-100) synangia, borne along the veinlets, and almost completely covering the backs of the sporophylls.

Type species, *Acrostichum nodosum* L.

Leaves pinnate.

Sterile pinnae 3 cm. or more broad.

Stipes without nodes; pinnae 15 or more, acuminate.

Fertile pinnae not more than 2 cm. broad; sterile pinnae rounded at the base.

1. *D. nodosa*.

Fertile pinnae 2-2.5 cm. broad; sterile pinnae more or less cuneate at the base.

2. *D. grandifolia*.

3. *D. elliptica*.

Stipes with 1-5 nodes; pinnae 5-13, mostly acute.

Sterile pinnae not more than 2.5 cm. broad, usually less.

Terminal node without pinnae, the leaves even-pinnate.

4. *D. Jenmani*.

Terminal pinna present, the leaves odd-pinnate.

Leaves about 15 cm. high, the margins irregularly lacerate.

5. *D. crispa*.

Leaves 40 cm. or more high, the margins merely serrate.

Veinlets mostly simple.

Veinlets not paired in origin, usually not less than 1 mm. apart (6-12 per cm.).

Pinnae mostly straight, the base usually obtuse, even truncate or cordate.

6. *D. alata*.

Pinnae mostly somewhat falcate, the base acute.

7. *D. Fendleri*.

Veinlets distinctly paired in origin, 18-20 per cm.

8. *D. cuspidata*.

Veinlets mostly forking, 12-15 per cm.

Sterile pinnae merely acute; fertile pinnae not more than 3.5 cm. long.

9. *D. Wrightii*.

Sterile pinnae acute or acuminate; fertile leaves with some pinnae 5 cm. or more in length.

Fertile pinnae not more than 7 cm. long.

10. *D. jamaicensis*.

Fertile leaves with some pinnae 8 cm. or more long (8-12 cm.).

11. *D. stenophylla*.

12. *D. carillensis*.

Leaves simple.

1. *Danaea nodosa* (L.) Smith, Mém. Acad. Turin 5: 420. 1793.

Acrostichum nodosum L. Sp. Pl. 1070. 1753.

Danaea longifolia Desv. Ges. Nat. Freunde Berlin Mag. 5: 307. 1811.

A large species; leaves rather dull throughout, up to 2 meters long, the stipes without nodes, up to 1 m. long, brown, finely mottled, dotted with small purplish-brown dark-centered scales; sterile lamina often as much as 1 m. long and 60 cm. broad, oblong, usually about half as broad as long, the rachis brown, finely mottled, darkest at the nodes; pinnae 15-33, dull-green, oblong (elliptic in young fronds), slightly falcate, unequally rounded or sometimes cuneate below, acuminate, entire or sometimes undulate or faintly serrulate near the apex, 20-40 cm. long, 3-5 cm. broad; midveins sparsely scaly, the veinlets mostly

¹Completed by RALPH CURTISS BENEDICT.

simple but distinctly paired in origin, 11–15 per cm.; sporophylls similar but with shorter, much narrower pinnae, 1.5–2.5 cm. broad.

TYPE LOCALITY : Near Port de Paix, Haïti.

DISTRIBUTION : Throughout the West Indies and from Mexico to Brazil.

ILLUSTRATIONS : Plumier, *Traité Foug.* *pl.* 108; *Mém. Acad. Turin* 5: *pl.* 9, *f.* 11; Hook. & Grev. *Ic. Fil.* *pl.* 51.

2. *Danaea grandifolia* Underwood, sp. nov.

Related to *D. nodosa* but even larger; leaves up to 2 meters or more long, the stipes about 1 m. long, without nodes, olive, flecked with small purplish-brown appressed scales; sterile lamina up to 120 cm. long, 55 cm. broad, the rachis very narrowly winged; pinnae 15–29, oblong, 20–30 cm. long, 3.5–6.5 cm. broad, unequally cuneate, acuminate, stipitate, the stalks up to 1.5 cm. long, the margin entire, sometimes repand (lower pinnae somewhat reduced, the terminal pinna oblong); midveins sparsely scaly, the veinlets mostly forked, 9–15 per cm.; sporophylls in general similar but narrower, the pinnae 15.5–24.5 cm. long, 2.5–4 cm. broad.

Type collected in Valparaiso, Santa Marta, Colombia, 1898, *H. H. Smith* 992 (herb. N. Y. Bot. Gard.).

DISTRIBUTION : Panama and northern South America.

3. *Danaea elliptica* Smith, in Rees, *Cycl.* 11: *Danaea* no. 2. 1808.

Danaea media Liebm. *Vidensk. Selsk. Skr.* V. 1: 306. 1849.

Danaea polymorpha Leprieur; Baker, *Ann. Bot.* 5: 499. 1891.

Danaea oligosora Fourn.; Christ, *Hedwigia* 44: 369. 1905.

A broad-leaved species; rhizome rather stout, the leaf-nodes close; leaves rather glossy throughout, 30–90 cm. long, the stipes with one to five nodes, purplish-brown or brown, darker at the nodes, finely mottled, sparsely dotted with brown to purplish dark-centered scales; sterile lamina broadly oblong or somewhat ovate or rounded, 20–35 cm. long, 12–30 cm. broad, the rachis similar to the stipe; pinnae 5–13, oblique, mostly elliptic, sometimes lanceolate, oblong, or oblanceolate, 8–17 cm. long, 2–3.5 cm. broad (the lower pinnae often much reduced, the terminal pinna broader), straight, unequally rounded or cuneate below, usually acute above, or less commonly acuminate, entire throughout, the margin slightly and more or less unevenly repand; midveins not scaly, the veinlets forked near their origin, 8–11 per cm.; sporophylls mostly much narrower and taller, the pinnae up to 12 cm. long and 2.5 cm. broad.

TYPE LOCALITY : Jamaica.

DISTRIBUTION : West Indies and Mexico to Brazil.

ILLUSTRATION : Hook. & Grev. *Ic. Fil.* *pl.* 52.

4. *Danaea Jenmani* Underw. *Bull. Torrey Club* 29: 677. 1902.

A rather small slender species, with short blunt pinnae; rhizome slender, the leaf-nodes close; leaves 2–4, rather dull, 25–50 cm. long, the stipes usually with 1–2 nodes, olive, channeled when dry, 10–20 cm. long, scurfy with small, rather pale-brown, concolorous, appressed scales; lamina of the sterile frond usually narrowly oblong, sometimes elliptic, 15–30 cm. long, 9–18 cm. broad, the rachis green, or brownish with scales, narrowly and discontinuously winged; pinnae 20–30 (the terminal node without pinnae in mature fronds), oblong, 5–9 cm. long, 1.5–2.5 cm. broad, usually oblique, straight or slightly curved, abruptly narrowed both ways, cuneate to rounded below, acute or short-acuminate above, serrulate toward the apex; midveins scaly, the veinlets forking, 12–14 per cm.; sporophylls narrower, with shorter, much narrower pinnae.

TYPE LOCALITY : Jamaica.

DISTRIBUTION : Blue Mountains, Jamaica, altitude 600–1000 meters.

5. *Danaea crispa* Endres; Reichenb. f. *Bot. Zeit.* 30: 489. 1872.

The smallest species known from North America; rhizome green, succulent; leaves about 15 cm. long, 4–5 cm. broad; sterile lamina oblong, the rachis densely scaly; pinnae membranous, translucent, 31–39, the middle ones oblong, 2–2.5 cm. long, straight or slightly falcate, acute, unequally rounded, cordate or cuneate at the base, the margin crispate,

irregularly lacerate and repand; veinlets mostly forked; sporophylls with smaller, more distant pinnae.

TYPE LOCALITY: Costa Rica.

DISTRIBUTION: Known only from Costa Rica.

ILLUSTRATION: Christ, Farnkr. Erde 361. f.

6. *Danaea alata* Smith, Mém. Acad. Turin 5: 420. 1793.

A medium-sized plant; leaves dull, 35–70 cm. long, the stipes 10–25 cm. long, olive-brown or purplish with a coating of small scales, with 1–3 nodes, the upper of these sometimes retaining small vestigial pinnae; sterile lamina elliptic, 27–45 cm. long, 13–22 cm. broad, the rachis olive or olive-brown, usually densely scaly, narrowly and discontinuously winged; pinnae 11–27, somewhat oblique, mostly straight, the middle ones oblong, 9–13 cm. long, 1.7–2.5 cm. broad, unequally and broadly cuneate to truncate or even cordate below, acuminate above, the margins entire, or sometimes more or less serrulate (the lower pinnae much reduced, broadly ovate to orbicular, 1–3 cm. long, the terminal pinna elliptic, longer); midveins densely scaly throughout, the veinlets scaly, mostly simple, 6–10 per cm.; sporophylls narrower, with linear acute pinnae.

TYPE LOCALITY: Martinique.

DISTRIBUTION: Martinique, St. Vincent, and Grenada.

ILLUSTRATION: Plumier, Traité Foug. pl. 109.

7. *Danaea Fendleri* Underw. Bull. Torrey Club 29: 673. 1902.

Plant rather small; rhizome slender; leaves 50–60 cm. long, the stipes 20–25 cm. long with 1–3 nodes, olive-brown, finely mottled, sparsely scaly, the scales small, blackish, appressed; sterile lamina oblong, 30–35 cm. long, 12–16 cm. broad, the rachis olive, moderately scaly below, especially at the nodes, very narrowly winged; pinnae mostly less than their own breadth apart, more distant below, 13–25, somewhat oblique, and upwardly falcate, oblong, rather broad, 7–11 cm. long, 1.7–2.4 cm. broad (the lower pinnae reduced, the terminal pinna lanceolate), unequally diminishing at the base, the posterior portion narrower and usually longer, mostly gradually curved to the midvein, the anterior portion more abruptly diminished, varying from straight or slightly curved on the lower pinnae to excavate on the upper ones, abruptly narrowed at the apex, acute or acuminate, the margins thickened, finely undulate, serrulate toward the apex; midveins scaly below, the veinlets simple, nearly naked, 8–12 per cm.; sporophylls somewhat narrower, with very narrow pinnae.

TYPE LOCALITY: Trinidad.

DISTRIBUTION: Lesser Antilles and Trinidad.

8. *Danaea cuspidata* Liebm. Vidensk. Selsk. Skr. V. 1: 307. 1849.

A tall, rather slender plant; rhizome rather stout, the leaf-nodes close; leaves up to 120 cm. long, the stipes 50–60 cm. long, with 1 or 2 nodes, dull-olive or flecked with small blackish appressed scales; sterile lamina oblong or somewhat elliptic, 40–60 cm. long, up to 32 cm. broad, the rachis olive, sparsely scaly below, very narrowly winged in the upper half of the lamina; pinnae mostly separated by at least their own width, distant below, 33–39, mostly at right angles to the rachis, slightly falcate, linear-oblong, up to 16 cm. long, and 1.7 cm. broad (the lower pinnae somewhat reduced and broader, the terminal pinna lanceolate), unequally diminishing at the base, the posterior portion longer and narrower, gradually curved to the midvein, the anterior portion more abruptly diminishing, varying from rounded on the lower pinnae to excavate on the upper ones, the apex acuminate, the margins revolute at the base, more or less revolute and repand along the sides, serrulate toward the apex; midveins sparsely scaly, blackish, the veinlets forking or at least paired in origin, dark-colored, 18–20 per cm.

TYPE LOCALITY: Chinantla, Mexico.

DISTRIBUTION: Central America and Mexico.

9. *Danaea Wrightii* Underw. Bull. Torrey Club 29 : 676. 1902.

Plant rather low; leaves about 50–60 cm. long, the stipes 24–28 cm. long, usually with 2 nodes; sterile lamina oblong, 20–30 cm. long, 12–14 cm. broad; pinnae broad, 6–7 cm. long, up to 2 cm. broad, about 2 cm. apart along the rachis (the lower pinnae somewhat reduced and more distant) unequally rounded or blunt at the base, the apex blunt, the margins entire below, serrulate toward the apex; veinlets mostly forking, 11–15 per cm.; sporophylls narrower with narrower shorter pinnae, these 3–4.5 cm. long, the stipes clothed with rusty scales.

TYPE LOCALITY: La Guinea, Cuba.

DISTRIBUTION: Cuba and Porto Rico.

10. *Danaea jamaicensis* Underw. Bull. Torrey Club 29 : 675. 1902.

A rather small plant with slender, elongate pinnae; rhizome rather slender, leaf-nodes close; leaves 2 or 3, somewhat glossy, 40–75 cm. long, the stipes with 2 or 3 nodes, olive or sometimes reddish, finely mottled, channeled when dry, sparsely scaly when mature, the scales reddish-brown; sterile lamina oblong to ovate, 27–55 cm. long, 12–21 cm. broad, the rachis green or red, flecked with scales, very narrowly winged; pinnae elongate-oblong, 7–14 cm. long, 1.5–2 cm. broad, usually oblique, curved, abruptly and unequally narrowed below, cuneate or somewhat rounded, acuminate above and strongly mucronate-serrulate, the terminal pinna similar or lanceolate; midveins sparsely scaly, the veinlets forking, 12–14 per cm.; sporophylls very much narrower than the sterile leaves, the pinnae 4–7 cm. long.

TYPE LOCALITY: Jamaica.

DISTRIBUTION: Blue Mountains of Jamaica, at altitudes of 1300–1600 meters.

11. *Danaea stenophylla* Kunze, Farrnkr. 1 : 55. 1840.

Danaea Mazeana Underw. Bull. Torrey Club 29 : 676. 1902.

A rather tall plant; rhizome slender, elongate, the leaf-nodes separated; leaves 50–90 cm. long, the stipes 20–50 cm. long, with 2–4 nodes, dark reddish- or blackish-brown below, lighter above, flecked with small paler-brown appressed scales; sterile lamina elliptic or oblong, 25–40 cm. long, 18–25 cm. broad, the rachis dark-olive to olive-brown with a few scales, especially at the nodes, very narrowly winged; pinnae close, 21–33, somewhat oblique and falcate, linear-oblong, 8–15 cm. long, 1–2 cm. broad, unequally diminished at the base, the posterior portion narrower, longer, somewhat rounded, the anterior portion varying from rounded on the lower pinnae to excavate on the upper ones, abruptly acuminate, the tips sharply serrulate; midveins sparsely scaly, the veinlets naked, mostly forked, 12–15 per cm.; sporophylls narrower, taller, the pinnae much narrower, 6–12 cm. long.

TYPE LOCALITY: Guadeloupe.

DISTRIBUTION: Guadeloupe and Martinique.

ILLUSTRATION: Kunze, Farrnkr. *pl.* 28.

12. *Danaea carillensis* Christ, Bull. Soc. Bot. Genève II. 1 : 234. 1909.

Rhizome creeping, ascending, covered with numerous scars, and the bases of former leaves, blackish-brown, 14 cm. long, not more than 2.5 cm. thick; roots numerous, thick; leaves fascicled, about 4, the stipes slender, castaneous, 1.5 mm. thick, with 4 nodes, the last at the base of the lamina (*i. e.*, morphologically the terminal pinna, all the lateral pinnae being absent), articulate, smooth, minutely furfuraceous, 8–10 cm. long; lamina oblong-ovate, 14 cm. long, 3.5 cm. broad, the base cuneate, the apex rather abruptly acuminate, the margin slightly revolute and strikingly undulate, somewhat serrate at the apex; midvein castaneous, slender, the veinlets spreading, black, often simple and clustered, about 11 per cm., thickened at the margin.

TYPE LOCALITY: Carillo, Costa Rica, altitude 400 meters.

DISTRIBUTION: Known only from the type collection (*Wercklé* 365).

DOUBTFUL SPECIES

Danaea elata Liebm. Vidensk. Selsk. Skr. V. 1: 306. 1849. (Type from Hacienda de Jovo, State of Vera Cruz, Mexico, on bank of stream, altitude 500 meters.) According to Liebmann, this species has the habit of *D. nodosa*, but differs in having a nodose stipe, longer pinnae (20 cm.), and more of them (15 pairs), and a subentire apex.

Danaea pterorachis Christ, Bull. Soc. Bot. Genève II. 1: 235. 1909. (Type from Costa Rica.) "Espèce fortement ailée, mais très différente de *D. alata* Sw. par des nervures serrées et fourchues. Particulier par des articulations non ou peu enflées." ". . . Stipite 20 cm. longo, vix pinnæ anserinae crassitie . . . bis aut ter articulato. . . . Fronde usque ad 30 cm. longa, 18 cm. lata. . . . nervis plerumque furcatis, ca. 10 in centimetri spatio." Not clearly distinguished by the description from *D. alata*. Dr. Underwood, in his revision of *Danaea*, gave 6 as the number of veinlets per centimeter in *D. alata*, but from material now at hand in the Underwood Fern Herbarium, the revised count of 6-10, as given in the description above, was obtained.

Danaea Wendlandi Reichenb. f. Bot. Zeit. 30: 490. 1872. (Type from Costa Rica.) Perhaps a good species, belonging in the key with *D. Jenmani* ("pinna terminali seu minuta oblonga seu oblitterata"), from which it differs, as appears from Reichenbach's description, in having more pinnae—up to 34—and stipes without nodes. Christ has recently reported *D. Jenmani* from Costa Rica on the basis of a collection of Wercklé's, but as he states that the stipe is nodeless, it is perhaps better referable to *D. Wendlandi*.

2. MARATTIA Sw. Prodr. 128. 1788.

Myriotheca Commerson; Juss. Gen. Pl. 15; hyponym. 1789. — Poir. in Lam. Encyc. 4: 403. 1797.

Eupodium J. Smith; Hook. Gen. Fil. *pl.* 118. 1842.

Discostegia Presl, Abh. Böhm. Ges. Wiss. V. 4: 271. 1845.

Gymnotheca Presl, Abh. Böhm. Ges. Wiss. V. 4: 272. 1845.

Large coarse plants with erect, tuberous, fleshy, tough, often very stout rhizomes, and herbaceous, fleshy-stipulate, 2-3-pinnate, deltoid leaves, arranged in a circle, usually 2 m. or more long, the fertile and sterile leaves alike; venation free. Sporangia in two rows, opening by longitudinal slits, coalescent, forming two-lipped or two-valved 6-18-locular, oval or rounded, superficial synangia, borne near the ends of the veins, on a slightly raised receptacle, sessile, or in one species distinctly stalked, sometimes subtended by a scaly pseudo-indusium.

Lamina bipinnate, the ultimate pinnules 10-30 cm. long.

1. *M. laxa*.

Lamina tripinnate or more compound, the ultimate pinnules 1-5 cm. long.

2. *M. Kaulfussii*.

Synangia distinctly stalked.

Synangia sessile on a slightly raised receptacle.

3. *M. interposita*.

Ultimate pinnules all long-acute or acuminate, 2-5 cm. long.

Ultimate pinnules mostly blunt or merely short-acute.

Ultimate pinnules not less than 1 cm. long, mostly much longer (1-3.5), merely obscurely serrate and rather blunt.

4. *M. excavata*.

Some of the ultimate pinnules much smaller (0.5-1 cm. long), the larger ones usually deeply serrate or lobed, sharply acute.

Ultimate pinnules scaly along the midveins below.

5. *M. alata*.

Ultimate pinnules naked below.

6. *M. weinmanniaefolia*.

1. *Marattia laxa* Kunze, Linnaea 18: 306. 1844.

Gymnotheca laxa Presl, Abh. Böhm. Ges. Wiss. V. 4: 275. 1845.

A coarse plant; rhizome low, stout; leaves bipinnate, 1.5-4 meters long, the stipe 30-60 cm. long, smooth; lamina 1-1.25 m. long, deltoid; pinnae oblong or lanceolate; pinnules 10-30 cm. long, 1-3.2 cm. broad, linear-oblong, long-acute, the base blunt, truncate or cordate, the anterior side shorter, the margins more or less serrulate to irregularly crenate-serrate; veinlets mostly 1-2-forked, often with alternate simple veinlets; synangia elliptic, mostly 12-18-locular, nearly marginal.

TYPE LOCALITY: Mexico.

DISTRIBUTION: Mexico and Central America.

2. **Marattia Kaulfussii** J. Smith ; Hook. Gen. Fil. *sub pl.* 26. 1839.

Eupodium Kaulfussii J. Smith ; Hook. Gen. Fil. *pl.* 118. 1842.

Leaves up to 2 meters and more long, the stipe 60–90 cm. long ; lamina 90–120 cm. long, 60 cm. or more broad, deltoid, tripinnate or quadripinnatifid as to the basal pinnae ; pinnae 30 cm. or more long, 15–20 cm. broad ; pinnules 8–10 cm. long, the rachis winged, the ultimate pinnules oblong, regularly pinnatifid, the lobes blunt ; veinlets forking ; synangia with a distinct stalk, distinctly intramarginal, deeply cleft, the valves spreading.

TYPE LOCALITY : Dominica.

DISTRIBUTION : West Indies to Colombia, Ecuador and Brazil.

ILLUSTRATION : Hook. Gen. Fil. *pl.* 118.

3. **Marattia interposita** Christ, Bull. Herb. Boiss. II. 6 : 285. 1906.

Rhizome undescribed ; leaves tripinnate (intermediate between those of *M. alata* and *M. cicutaefolia* of South America, hence the specific name), with smooth greenish rachises, the ultimate rachises narrowly winged, with a few scattered scales ; pinnae 40 cm. or more long, up to 35 cm. broad, broadly ovate, stalked, the ultimate pinnules mostly alternate, 2–6 cm. long, 6–7 mm. broad, dark-green above, paler below, naked, cuneate, narrowly acute or acuminate, with sharply but rather finely serrate, revolute margins ; veinlets mostly 1–2-forked, very oblique ; synangia 6–8-locular, globoid, laterally compressed above, not deeply cleft or spreading.

TYPE LOCALITY : Costa Rica.

DISTRIBUTION : Known only from type locality.

4. **Marattia excavata** Underwood, sp. nov.

Rhizome erect, slender, 30–40 cm. high ; leaves tripinnate with smooth olivaceous-brown rachises ; pinnae stalked (5–15 cm.), with alternate rather closely placed pinnules ; pinnules short-stalked with a varying number of segments (up to 15 pairs) and ending in a slender serrulate undivided acuminate apical portion which may comprise the greater part of the pinnule ; ultimate rachises with slight wings which are more pronounced towards the distal portions of the pinnules ; ultimate pinnules 2.5–3.5 cm. long, oblong to narrowly ovate, more or less falcate, obliquely excavate at the superior base, nearly sessile, the margins plane, sharply serrate, the apex mostly blunt, acutish or rounded ; veinlets once-forked, bearing a single synangium near the end of the upper fork ; synangia submarginal, rather deeply cleft but not widely spreading, pale-brown, about 8–10 to a pinnule, oval, usually with 5–7 loculi on each side.

Type collected in humid forest, Coliblanco, Costa Rica, altitude about 2000 meters, May 1, 1906, *Maxon 272*.

DISTRIBUTION : Guatemala and Costa Rica.

5. **Marattia alata** Sw. Prodr. 128. 1788.

Marattia laevis Smith, Pl. Ic. Ined. *pl.* 47. 1790.

Myriothea alata Poir. in Lam. Encyc. 4 : 403. 1797.

Myriothea laevis Poir. in Lam. Encyc. 4 : 403. 1797.

Discostegia alata Presl, Abh. Böhm. Ges. Wiss. V. 4 : 272. 1845.

Discostegia laevis Presl, Abh. Böhm. Ges. Wiss. V. 4 : 272. 1845.

Rhizome very stout and fleshy ; leaves tripinnate or even quadripinnate as to the lower pinnae, up to 3 meters long, the stipe 30–60 cm. long, 2.5 cm. thick at the base, the rachis stramineous, sometimes darker, sparsely scaly, the ultimate rachises winged, scaly on the under side ; lamina a meter or more long, broadest at the base ; pinnae up to 70 cm. or more long, oblong to deltoid ; pinnules 10–25 cm. long, long-acuminate, the apices sharply serrate ; ultimate pinnules 1–2.5 cm. long, 4–8 mm. broad, oblong or elliptic, more or less scaly underneath, unequally narrowed, cuneate, the apices acute to blunt, the margins sharply serrate ; veinlets simple or once-forked ; synangia broadly oblong, rather shallow, 8–16-locular, deeply cleft, the valves opening widely, the receptacle oblong or oval, usually scaly.

TYPE LOCALITY : Jamaica.

DISTRIBUTION : Cuba, Jamaica, and Hispaniola.

ILLUSTRATION : Hook. Gen. Fil. *pl.* 26.

6. *Marattia weinmanniaefolia* Liebm. Vidensk. Selsk.

Skr. V. 1 : 308. 1849.

Gymnotheca weinmanniaefolia de Vriese, Monogr. Maratt. 11. 1853.*Marattia Laucheana* Blass, Hamb. Gartenz. 14 : 233. 1858.

Rhizome short, fleshy, barely 15 cm. high ; leaves about 2 meters long, tripinnate, broadly lanceolate ; rachis sparsely scaly, olivaceous-brown ; pinnae opposite, lanceolate, 40–60 cm. or more long, 10–15 cm. apart ; pinnules alternate, 10–12 cm. long, about 2 cm. broad, lanceolate, close, 2.3–5 cm. apart, the ultimate rachises smooth, except at the insertion, the ultimate pinnules discontinuously winged ; ultimate pinnules coriaceous, 10–12 mm. long, about 5 mm. broad, unequally narrowed and obtuse at the base, naked below, the apex blunt, serrate ; veinlets mostly simple ; synangia 16-locular, the receptacle linear or thicker, naked.

TYPE LOCALITY : Villa Alta, Oaxaca, Mexico.

DISTRIBUTION : Oaxaca ; Guatemala ; and in cultivation (*M. Laucheana*).

Order FILICALES

BY LUCIEN MARCUS UNDERWOOD AND WILLIAM RALPH MAXON

Sporophytes terrestrial or epiphytic (or in one family aquatic), herbaceous to arboreous, consisting of a radicate creeping, ascending, or erect primary axis, the stem (rhizome or caudex), and more or less expanded leaves (fronds), these minute to many meters long and of diverse form. Sporangia developed normally from single epidermal cells (leptosporangiate),¹ variously disposed, mainly upon the under surface of the leaf, commonly in clusters (sori) upon the veins, or within special marginal indusia, or, less commonly, irregularly or in rows upon rachiform or scarcely foliose pinnae or segments. Indusia of various form, or wanting.

Gametophytes normally in the form of green flattish or filamentous prothallia, each bearing both archegonia and antheridia (monoecious), or less commonly these borne upon separate prothallia (dioecious).

Sporangia sessile or short-stalked.

Plants usually aquatic.

Fam. 2. CERATOPTERIDACEAE.

Plants terrestrial or epiphytic.

Sporangia not associated in definite sori, mostly (as to American species) borne upon rachiform or narrowly foliose pinnae or segments.

Sporangia irregularly placed, provided with an incomplete lateral annulus above the middle; plants mesophilous or hydrophilous.

Fam. 1. OSMUNDACEAE.

Sporangia borne in definite rows, provided with a complete subapical annulus; plants mainly xerophilous.

Fam. 3. SCHIZAEACEAE.

Sporangia usually associated in definite clusters (sori).

Sori mostly borne upon the backs of the leaves or (by suppression of the leaf-tissue) marginal, the sporangia radial in one or several ranks upon definite receptacles arising from the veins or less commonly continuous with them.

Sporangia subglobose or obconic, relatively few, dehiscing vertically, the sorus flattened; receptacle scarcely elevated.

Fam. 4. GLEICHENIACEAE.

Sporangia ovoid, very numerous, dehiscing horizontally, the sorus essentially globose; receptacle considerably elevated.

Fam. 5. CYATHEACEAE.

Sori invariably marginal, terminal upon the modified elongate free ends of the veins (receptacles) within tubular or salverform indusia; leaf-tissue usually delicately membranous.

Fam. 7. HYMENOPHYLLACEAE.

Sporangia long-stalked.

Fam. 6. POLYPODIACEAE.

¹ In the Osmundaceae the origin of the sporangia is sometimes intermediate between the eusporangiate and leptosporangiate types.

Family 1. OSMUNDACEAE

BY RALPH CURTISS BENEDICT

Rhizomes erect or creeping, woody, the roots fibrous, not fleshy. Leaves fasciculate, inarticulate, pinnately divided, alike, or entirely dimorphic, or with dimorphic pinnae. Sporangia borne along the ultimate veinlets, either on the backs of ordinary leaves, or entirely replacing the vegetative tissue and in dense panicle clusters, globose, short-pedicellate, longitudinally dehiscent, the annulus few-celled or wanting. Spores green, ephemeral. Prothallia green, flat, expanded, with a thickened ventral ridge on which the archegonia and antheridia are borne.

1. OSMUNDA L. Sp. Pl. 1063. 1753.

Aphyllocalpa Cav. Anal. Ci. Nat. 5: 164. 1802.

Plenasium Presl, Tent. Pterid. 109. 1836.

Osmundastrum Presl, Abh. Böhm. Ges. Wiss. V. 5: 326. 1847.

Coarse plants with creeping, mostly subterranean rhizomes surrounded by a dense thick mass of fibrous hard black or dark-brown roots. Leaves densely clothed with long white or brown hairs when young, glabrous or nearly so when mature, dimorphic or with dimorphic pinnae, arranged in two circles, the sporophylls taller and erect, and in the center, but developed earlier and below the spreading sterile leaves, the stipes expanded just above the base to form sheathing wings. Sporangia replacing the leaf-tissue, and borne in dense panicle clusters on the ultimate veinlets.

Type species, *Osmunda regalis* L.

Leaves normally entirely dimorphic, the sporophylls much contracted, the sterile leaves 2-pinnatifid, the pinnae with a tuft of tomentum at the base. 1. *O. cinnamomea*.

Leaves merely partly dimorphic.

Sporophyll with the apical portion fertile; sterile leaves 2-pinnate. 2. *O. regalis*.

Sporophyll with median portion fertile; sterile leaves 2-pinnatifid, the pinnae without tomentum at the base. 3. *O. Claytoniana*.

1. *Osmunda cinnamomea* L. Sp. Pl. 1066. 1753.

? *Osmunda bipinnata* L. Sp. Pl. 1065. 1753.

Osmunda alata Goldie, Edinb. Phil. Jour. 6: 322. 1822.

Osmundastrum cinnamomeum Presl, Abh. Böhm. Ges. Wiss. V. 5: 326. 1847.

Rhizomes and root-masses subterranean or partly aerial, and forming tussocks in wet ground, the roots black; leaves 50–150 cm. long, wholly dimorphic, the stipes 15–50 cm. long, the sheathing bases produced anteriorly to form two rounded stipuliform lobes, the stipe and rachis glabrous when mature but with tufts of tomentum at the base of each pinna; sterile lamina narrowly oblong or elliptic-lanceolate, 35–100 cm. long, 15–30 cm. broad, usually gradually narrowed above, acute, pinnate, the pinnae deeply pinnatifid, mostly in pairs, at least below, but not quite opposite, narrowly oblong, 8–18 cm. long, 1.5–4 cm. broad, long-acute or acuminate, mostly oblique, but sometimes straight or somewhat recurved, or with the tips curved up, glabrous or sometimes minutely viscid-glandular, rather shining below, the segments close, falcate, with the anterior margins concave, oblong, usually acute or acutish, but sometimes blunt or rounded; veinlets once-forked; fertile lamina very narrow, thick, erect, soon disappearing, the pinnae pinnate owing to the reduction of the leaf-tissue, the segments consisting merely of the midveins and shortened thickened veinlets, densely covered when mature with the cinnamon-brown sporangia.

TYPE LOCALITY: Maryland.

DISTRIBUTION: Eastern North America, Mexico, and the West Indies; also in southeastern Asia.

ILLUSTRATIONS: D. C. Eaton, Ferns N. Am. *pl.* 29, *f.* 3–5; Lowe, Ferns Brit. & Exot. 8: *pl.* 2; Britt. & Brown, Ill. Fl. *f.* 9.

2. *Osmunda regalis* L. Sp. Pl. 1065. 1753.*Osmunda spectabilis* Willd. Sp. Pl. 5: 98. 1810.*Osmunda glaucescens* Link, Fil. Sp. 20. 1841.*Osmunda mexicana* Fée, Mém. Foug. 9: 43 (34). 1857.

Rhizomes and root-masses subterranean or partly aërial, forming tussocks, the roots black; leaves 35–180 cm. long, partly dimorphic, the stipes 15–60 cm. long, the sheathing bases abruptly narrowed above but not lobed, the stipe and rachis smooth, brown or dark-stramineous, polished, glabrous when mature; sterile lamina broadly oblong, 25–120 cm. long, 20–30 cm. broad, obtuse or broadly acute, bipinnate, the pinnae conformably divided, distant, strictly paired and nearly opposite, oblong to ovate-lanceolate or deltoid-ovate, 11–40 cm. long, 6–13 cm. broad, broadly acute, oblique, straight, glabrous, dull-green, the pinnules rather distant, very short-stalked, straight, the lateral pinnules oblong, 2–7.5 cm. long, 0.5–2 cm. broad, acute, with unequally truncate to rounded bases, the terminal segment lanceolate, broader, with a cuneate base; veinlets mostly 2-forked; fertile lamina in general like the sterile one but usually narrower, owing to the very oblique habit of the pinnae, and with the pinnae in the upper third of the lamina much reduced and contracted, the fertile pinnules mostly erect, consisting of a narrowly winged midvein, and the thickened shortened often forked veinlets densely covered with the cinnamon-brown sporangia.

TYPE LOCALITY: Europe.

DISTRIBUTION: Eastern North America, Mexico, and the West Indies; also in South America, Europe, Asia, and South Africa.

ILLUSTRATIONS: D. C. Eaton, Ferns N. Am. *pl.* 28; Lowe, Ferns Brit. & Exot. 8: *pl.* 1; Britt. & Brown, Ill. Fl. *f.* 8.3. *Osmunda Claytoniana* L. Sp. Pl. 1066. 1753.*Osmunda interrupta* Michx. Fl. Bor. Am. 2: 273. 1803.*Osmunda basilaris* Spreng. Anleit. 3: 160. 1804.*Plenasium Claytoniana* Presl, Abh. Böhm. Ges. Wiss. V. 5: 325. 1847.*Plenasium interruptum* Presl, Abh. Böhm. Ges. Wiss. V. 5: 325. 1847.

Rhizomes and root-masses subterranean, the roots dark-brown; leaves 30–150 cm. long, partly dimorphic, the stipes 9–65 cm. long, the sheathing base narrowing at an acute angle into the upper part, the stipe and rachis glabrous when mature; sterile lamina narrowly oblong or lanceolate, 19–85 cm. long, 7–30 cm. broad, abruptly short-acuminate, pinnate, the pinnae deeply pinnatifid, mostly in pairs, at least below, but not exactly opposite, oblong or somewhat lanceolate, 5–15 cm. long, 1.5–3.5 cm. broad, straight or slightly recurved, rather short-acute, often bluntish, nearly glabrous but with scattered brown hairs along the veinlets below, dull-green, the segments close, mostly straight, with the anterior margin usually straight, oblong, mostly blunt or rounded; veinlets once-forked; fertile lamina in general like the sterile but with 1–4 pairs of fertile pinnae near (usually just below) the middle of the lamina, the fertile pinnae pinnate, deltoid, strongly falcate, about half as long as the sterile pinnae, the segments crowded, either consisting only of the midveins and the thickened shortened veinlets on which the dark-brown sporangia are thickly borne, or sometimes narrowly winged.

TYPE LOCALITY: Virginia.

DISTRIBUTION: Newfoundland to Minnesota, southward to North Carolina and Missouri; also in India and China.

ILLUSTRATIONS: D. C. Eaton, Ferns N. Am. *pl.* 29, *f.* 1, 2; Lowe, Ferns Brit. & Exot. 8: *pl.* 3; Meehan's Mo. 4: *pl.* 10; Britt. & Brown, Ill. Fl. *f.* 10.

Family 2. CERATOPTERIDACEAE

BY RALPH CURTISS BENEDICT

Aquatic or semi-aquatic plants of tropical or sub-tropical regions. Stem creeping, sparsely scaly, reduced, rootless, the roots borne on the stipes. Leaves alternate, successive, viviparous, soft-herbaceous, dimorphic, the venation reticulate, without included veinlets, the sterile leaves floating or emergent, the sporophylls taller, erect, 2-5 times pinnately divided the ultimate segments linear, with the margins evenly and narrowly revolute, often meeting along the midvein, and including 2 or 3 rows of narrow areolae. Sporangia abaxial, scattered in 1 or 2 lines along the longitudinal veinlets, thin-walled, globose, nearly sessile, the wall-cells sinuate, containing chlorophyll, the annulus few-celled (4-10), or many-celled (20-70) and with 8-10 lip-cells. Spores ephemeral, triplanate, the inner (cleavage) faces smooth, the outer portion rounded and regularly marked with three series of anastomosing ridges.

1. CERATOPTERIS Brongn. Bull. Soc. Philom. 1821: 186. 1821.

Teleozoma R. Br.; Richards. in Franklin, Journey 767. 1823.

Ellebocarpus Kaulf. Enum. Fil. 147. 1824.

Parkeria Hook. Exot. Fl. pl. 147. 1825.

Furcaria Desv. Mém. Soc. Linn. Paris 6: 292. 1827.

Characters of the family.

Type species, *Acrostichum thalictroides* L.

Lamina of the mature sterile leaves usually oblong; spores 32; annulus and lip-cells well-developed.

1. *C. thalictroides*.

Lamina of the sterile leaves broadly deltoid or pentagonal.

Spores 16; annulus and lip-cells well-developed; mature sterile leaves emergent, the lamina broadly deltoid, 25-40 cm. long, 2-pinnate.

2. *C. deltoidea*.

Spores 32; annulus few-celled, lip-cells wanting; mature sterile leaves floating, the lamina pentagonal, not more than 20 cm. long, 2-4-pinnatifid.

3. *C. pteridoides*.

1. *Ceratopteris thalictroides* (L.) Brongn. Bull. Soc.

Philom. 1821: 186. 1821.

Acrostichum thalictroides L. Sp. Pl. 1070. 1753.

Pteris thalictroides Sw. Jour. Bot. Schrad. 1800²: 65. 1801.

Teleozoma thalictroides R. Br.; Richards. in Franklin, Journey 767. 1823.

Furcaria thalictroides Desv. Mém. Soc. Linn. Paris 6: 292. 1827.

Leaves slender, erect, strict, 6-75 cm. long, the stipes slender, 4-27 cm. long; lamina of the sterile leaf narrowly deltoid or oblong, 3.5-28 cm. long, 2-13 cm. broad, 1-2-pinnate-pinnatifid, the pinnae ovate-lanceolate, the segments linear-lanceolate or oblong, acute, 1-2.5 cm. long, 2-5 mm. broad; sporophylls taller than the sterile leaves, the lamina oblong, 2-5-pinnately divided, the pinnae and smaller divisions distant, the ultimate segments flagelliform, 1-5 cm. long, the margins of the ultimate and penultimate divisions narrowly revolute, covering 1-2 rows of areolae and sporangia; sporangium with well-developed annulus and lip-cells; spores 32.

TYPE LOCALITY: Ceylon.

DISTRIBUTION: Jamaica; widely distributed in the Old World tropics.

ILLUSTRATIONS: L. Amoen. Acad. 1: pl. 12, f. 3; Bull. Torrey Club 36: 468. f. 1.

2. *Ceratopteris deltoidea* Benedict, Bull. Torrey Club 36: 472. 1909.

Plants always partly submerged; leaves up to 65 cm. long, the stipe flattened, not bulbous; sterile leaves 15-45 cm. long, floating and emergent; lamina of the earliest leaves

simple, ovate or deltoid, in the following leaves 3-7-lobed and broadly rhombic to pentagonal, the lobes deltoid, acute; mature sterile leaves taller, erect, 25-50 cm. long, the stipes 10-20 cm. long, flattened, the lamina deltoid, acute, 20-35 cm. long, 15-25 cm. broad, 2-pinnate-pinnatifid, the lowest with 5-8 pairs of pinnae, broadly deltoid, 9-12 cm. long, 9-14 cm. broad, the ultimate segments lanceolate to deltoid, 3-4 cm. long, 0.5-3 cm. broad, acute; sporophylls 40-65 cm. long, the stipes flattened, the lamina deltoid, 30-40 cm. long, 25-37 cm. broad, 4 times pinnately divided, the ultimate segments linear, 0.5-2 cm. long, 0.5-2 mm. broad; sporangium with well-developed annulus (40-50-celled) and lip-cells · spores 16.

TYPE LOCALITY: Orange Bay River, Jamaica.

DISTRIBUTION: Florida and Louisiana; Porto Rico; Jamaica; also in South America (?).

ILLUSTRATION: Bull. Torrey Club 36: 473. *f.* 3.

3. *Ceratopteris pteridoides* (Hook.) Hieron. Bot.

Jahrb. 34: 561. 1905.

Parkeria pteridoides Hook. Exot. Fl. 147. 1825.

Ceratopteris Parkeria J. Smith, Jour. Bot. Hook. 4: 70. 1841.

Plants floating, or partly submerged and rooted in soil; leaves in the floating plants up to 25 cm. long, the stipes expanded midway, bulbous; lamina in earliest sterile leaves simple, ovate or deltoid, in following leaves broadly 3-lobed, deltoid or rhombic, in still later leaves pentagonal, 6-20 cm. long, 6-20 cm. broad, 1-3 times pinnatifid, with 2-4 pairs of primary divisions, the ultimate segments broadly ovate or deltoid, usually blunt or rounded; lamina in succeeding leaves 2-4 times divided with narrowly oblong, rounded segments, grading into the slightly taller sporophylls with linear segments; leaves in the anchored plants as above but with the stipes not bulbous, with the sporophylls about twice as tall as the sterile leaves, up to 40 cm. long, and without intermediate forms; sporangia in one row along each margin, without lip-cells, the annulus 4-10-celled, rarely more; spores 32.

TYPE LOCALITY: Essequibo, British Guiana.

DISTRIBUTION: Florida and Cuba; also in Brazil and Guiana.

ILLUSTRATIONS: Hook. *loc. cit.*; Hook. & Grev. Ic. Fil. *pl.* 97.

Family 3. SCHIZAEACEAE

BY WILLIAM RALPH MAXON

Mainly tropical xerophilous plants of widely diverse form and habit. Sporangia superficial, borne singly or in rows on narrow more or less specialized lobes or terminal segments, or upon the very slender ultimate divisions of non-foliose pinnae, indusiate or non-indusiate, obovoid or pyriform (or, in the African genus *Mohria*, globose), provided with a definite subapical annulus or corona contracted distally, the sporangium dehiscing by a longitudinal fissure. Prothallia reniform to spatulate or more or less filamentous and branched, terrestrial.

Fibro-vascular bundle of the rhizome central, solid.

Fronds twining, elongate, dorsal, apparently inserted in a single row; spores triplanate.

1. *LYGODIUM*.

Fronds upright or ascending, not twining, borne in several ranks; spores diplanate.

Fertile segments spuriously digitate: sporangia apparently borne in 4 more or less complete rows.

2. *ACTINOSTACHYS*.

Fertile segments forming a pinnate spike; sporangia obviously in 2 rows.

Fronds mostly linear and simple, or, if dichotomous, the few slender divisions never forming a definite lamina.

3. *SCHIZAEA*.

Fronds distinctly stipitate, the lamina repeatedly dichotomous, the divisions close and usually numerous.

4. *LOPHIDIUM*.

Fibro-vascular bundle of the rhizome in the form of a reticulate tube.

5. *ANEMIA*.

1. *LYGODIUM* Sw. Jour. Bot. Schrad. 1800²: 106. 1801.

Odontopteris Bernh. Jour. Bot. Schrad. 1800²: 127. *pl.* 2, *f.* 4. 1801.

Gisopteris Bernh. Jour. Bot. Schrad. 1800²: 129. 1801.

Ugena Cav. Ic. 6: 73. 1801.

Ramondia Mirb. Bull. Soc. Philom. 2: 179. 1801.

Hydroglossum Willd. Schr. Akad. Wiss. Erfurt. 1802: 20. 1802.

Cteisium Michx. Fl. Bor. Am. 2: 275. 1803.

Lygodictyon J. Smith, Lond. Jour. Bot. 2: 284. 1842.

Mainly plants of tropical and subtropical regions with slender vine-like twining fronds of indefinite growth, these borne dorsally and apparently in a single row upon a slender branched underground rhizome. Primary rachis wiry, more or less flexuous; leafy parts consisting of stalked subpalmately lobed, pinnate, or pinnately compound secondary pinnae arising in pairs from alternate slender or usually short naked stalks (the primary pinnae), with an included usually abortive bud, the primary pinnae thus pseudodichotomous. Sporangia strongly curved, laxly disposed in a row upon each side of the midvein of the contracted segments (sporangiophores), dorsal and solitary upon the simple pinnately arranged veinlets, protected each by a connate cucullate indusium formed of the modified leaf-tissue and opening antrorsely. Spores triplanate, yellow or whitish, smooth, verrucose, or less commonly reticulate.

Type species, *Ophioglossum scandens* L.

Sterile secondary (geminate) pinnae apparently subpalmate.

Primary branches slender, elongate; secondary pinnae up to 6 cm. long, the lobes oblong to lanceolate, obtusish.

1. *L. palmatum*.

Primary branches evident as short tubercles; secondary pinnae up to 25 cm. long, the segments linear-lanceolate, acute or attenuate.

2. *L. radiatum*.

Sterile secondary (geminate) pinnae pinnate, the tertiary segments or divisions mostly petiolate.

Tertiary sterile segments nearly equal.

Veins free.

Rachis of secondary pinnae strongly flexuous; tertiary segments oblong-lanceolate.

3. *L. volubile*.

- Rachis of secondary pinnae nearly straight; tertiary segments similar or broadly ligulate, usually much larger. 4. *L. micans*.
 Veins areolate. 5. *L. heterodoxum*.
 Upper tertiary segments mostly shorter than the basal.
 Rachis of secondary pinnae at most slightly flexuous.
 Costae of tertiary segments nodose-articulate, the basal costulae opposite; leaf-tissue usually subopaque. 6. *L. venustum*.
 Costae of tertiary segments not nodose-articulate, the basal costulae usually alternate; leaf-tissue commonly lustrous, at least above. 7. *L. mexicanum*.
 Rachis of secondary pinnae divaricate-flexuous.
 Sterile tertiary and quaternary segments linear to linear-lanceolate from a strongly inequilateral semicordate base; rigidly coriaceous. 8. *L. cubense*.
 Sterile tertiary and quaternary segments lanceolate-hastate or trifoliate from a cuneate base; membrano-herbaceous. 9. *L. oligostachyum*.

1. *Lygodium palmatum* (Bernh.) Sw. Syn. Fil. 134. 1806.

Gisopteris palmata Bernh. Jour. Bot. Schrad. 1800²: 129. 1801.

Ramondia palmata Bosc, Bull. Soc. Philom. 2: 179. 1801.

Hydroglossum palmatum Willd. Schr. Acad. Erfurt. 1802: 25. 1802.

Cleisium paniculatum Michx. Fl. Bor. Am. 2: 275. 1803.

Fronds 0.5-1.5 meters long; rhizome wide-creeping, 1 mm. or less in diameter, dichotomous, dark-brown, closely covered with brownish few-celled flattish hairs; stipe brownish-stramineous from a darker base, about 0.5 mm. in diameter, the rachis similar, subterete, very narrowly marginate; primary branches 5 mm. or less long, slender, the terminal bud not evident and invariably dormant; sterile secondary (geminate) pinnae petiolate (1-2.5 cm.), 2.5-6 cm. long, 3-8 cm. broad, orbicular to broadly reniform, dichotomously pedatifid $\frac{1}{2}$ to $\frac{2}{3}$ the distance to the cordate base into 4-8 unequal spreading lobes, thus subpalmate, the outer lobes small and irregularly rounded or often emarginate, the principal ones oblong to lanceolate, obtusish; costae dichotomous at the non-articulate apex of the petiole, the branches pedately forked, slightly elevated, slender, strongly flexuous, scarcely attaining the apex of the lobes; veins slender, mostly immersed, oblique, 1-3 times dichotomous; leaf-tissue membrano-papyraceous, bright-green above but scarcely lustrous in drying, much paler below, glabrescent, the margins entire or minutely repand. Fertile secondary (geminate) pinnae usually occupying the upper portion of the frond, 3-4-pinnate, deltoid-ovate to rhombic-ovate in outline, inequilateral, the tertiary segments 2-4-jugate, the costules very slender, flexuous, narrowly foliaceous, the ultimate ones dichotomous; sporangiophores oblong, flattish, obscurely crenate-serrate, up to 7 mm. long; spores delicately and minutely verrucose.

TYPE LOCALITY: Pennsylvania.

DISTRIBUTION: Low woods and thickets, New Hampshire and Massachusetts to Florida; also in Kentucky and Tennessee. Mainly coastal.

ILLUSTRATIONS: Schkuhr, Krypt. Gew. *pl.* 140; Torr. Fl. N. Y. *pl.* 161; Hook. Fil. Exot. *pl.* 24; Lowe, Ferns Brit. & Exot. 8: *pl.* 74; Willd. *loc. cit.* *pl.* 1, f. 2; D. C. Eaton, Ferns N. Am. *pl.* 1; Denks. Akad. Wiss. Wien 23: *pl.* 17, f. 12, 13; Ettingsh. Farnkr. *pl.* 171, f. 2, 4, 5; Britt. & Brown, Ill. Fl. f. 13.

2. *Lygodium radiatum* Prantl, Schiz. 66. 1881.

Lygodium digitatum D. C. Eaton, Mem. Am. Acad. II. 8: 217. 1860. Not *L. digitatum* Presl, 1825.

Fronds several meters long; rachis dull-stramineous to light-brownish, subterete, narrowly marginate, about 1.5 mm. in diameter; primary branches reduced to small knob-like protuberances upon the primary rachis; secondary (geminate) pinnae up to 25 cm. long, petiolate (3-4 cm.), obdeltoid to suborbicular in outline, either dichotomously pedatifid to within 1-2 cm. of the subtruncate or cuneate base, or, rarely, once-dichotomous; segments usually 3-7 (rarely 2), linear-lanceolate, acute or attenuate, 10-23 cm. long, 1-2.5 cm. broad, the costae stout, elevated, subflexuous toward the apex; veins elevated, directed toward the margin nearly at a right angle, mostly once or twice dichotomous, apart, the branches extending each to sharp serratures of the margin, or in fertile segments about half of them extending to the sporangiophores; leaf-tissue membrano-herbaceous, lustrous upon both surfaces, lighter and glandular below, otherwise glabrous; sporangiophores up to 6 mm. long, irregularly placed, mostly more than their width apart, sessile, serrate; spores minutely verrucose.

TYPE LOCALITY: Gatun, Panama.

DISTRIBUTION: Panama and Colombia.

3. *Lygodium volubile* Sw. Jour. Bot. Schrad. 1801²: 304. 1803.

Hydroglossum volubile Willd. Sp. Pl. 5: 78. 1810.

Lygodium Wrightii D. C. Eaton; Prantl, Schiz. 78. 1881.

Fronds climbing 4-10 meters; rhizome short-creeping, corrugate, dark-brown, densely clothed with slender blackish hairs; stipe and rachis up to 3 mm. in diameter, yellowish to brownish-castaneous, subterete, narrowly marginate, puberulous, glabrescent; primary branches evident as short tubercles upon the rachis, the terminal bud inconspicuous; sterile secondary (geminate) pinnae petiolate (1.5-3 cm.), orbicular to broadly oblong-ovate, acute, 10-20 cm. long, 8-20 cm. broad, pinnate, the rachis relatively slender, subdivaricate-flexuous, stramineous to brownish, narrowly marginate, short-pubescent (especially above), glabrescent; tertiary segments 2-4 pairs, subequal, distant, petiolate (5-10 mm.), oblong-lanceolate from a broadly cuneate or rounded subtruncate (or, rarely, sharply auriculate-hastate) base, 4-15 cm. long, 1-2.5 cm. broad, the apex acute, acuminate, or rarely attenuate, the costae nodose-articulate, flexuous, elevated, stoutish, extending to the apex, bearing a few antrorse hairs; terminal segment conform, rarely confluent with the next below; veins oblique, curved, elevated, mostly 1-2 times dichotomous, glabrous; leaf-tissue coriaceous-herbaceous, bright-green, lustrous upon both surfaces, paler below, glabrous or obscurely short-pilose, the margins cartilaginous, lightly crenulate-serrate, the serrations distant. Fertile secondary (geminate) pinnae similar to the sterile in shape, pinnate or commonly bipinnate, the lower tertiary segments then deltoid, the quaternary segments 1-jugate or rarely subjugate, opposite, short, spreading; sporangiophores numerous, terminating the stronger branch of the mostly 1-2-forked veins, up to 1 cm. long, serrate, glabrous above, sparsely short-pilose below; spores minutely punctate, obscurely subcristate-tuberculate.

TYPE LOCALITY: Jamaica.

DISTRIBUTION: Jamaica and Cuba; also from northern South America to Brazil.

ILLUSTRATION: Sloane, Hist. Jam. *pl.* 46, *f.* 1.

4. *Lygodium micans* Sturm, in Mart. Fl. Bras. 1²: 178. 1859.

Osmunda scandens Aubl. Pl. Guian. 2: 961. 1775.

Lygodium scandens Schkuhr, Krypt. Gew. 1: 138, excl. syn. 1809. Not *L. scandens* Sw. 1801.

Fronds very ample, apparently high-climbing; primary rachis stout, subterete, very narrowly marginate, dull-stramineous to light-brown; primary branches evident only as stout protuberances upon the primary rachis, the terminal bud minute; sterile secondary (geminate) pinnae petiolate (2-4.5 cm.), very broadly ovate or oblong to transversely oblong, 15-30 cm. long, 15-35 cm. broad, once-pinnate, the rachis nearly straight, narrowly marginate above, brownish short-pubescent (especially above), glabrescent; tertiary segments 2-5 pairs, subequal, distant or subdistant, petiolate (5-10 mm.), broadly ligulate to oblong-lanceolate from a rounded or subcordate base, 10-25 cm. long, 1-3.8 cm. broad, the costae nodose-articulate, greatly elevated, straight, stout, extending to the apex, bearing a few scattering antrorse hairs, the terminal segment sometimes joined to the next below; veins directed toward the margin at a wide angle, 2-3 times dichotomous, the branches straight and parallel, elevated, glabrous; leaf-tissue rigidly coriaceous-herbaceous, lustrous upon both surfaces, paler below, glabrous, the margins distinctly crenate-serrate, the teeth close. Fertile secondary (geminate) pinnae similar to the sterile, the veins similarly dichotomous, nearly all the branches extending to the sporangiophores, the few sterile branches excurrent to sharp marginal teeth; sporangiophores very numerous and close, up to 1 cm. long, sharply serrate, pilose along the midvein above and at the base below; spores coarsely subcristate-tuberculate.

TYPE LOCALITY: British Guiana.

DISTRIBUTION: Panama; also in Trinidad and Guiana; accredited to Santo Domingo.

ILLUSTRATION: Schkuhr, *loc. cit.* *pl.* 138.

5. *Lygodium heterodoxum* Kunze, Farrnkr. 2: 32. 1849.

Hydroglossum spectabile Liebm. Vidensk. Selsk. Skr. V. 1: 299. 1849.

Hydroglossum heterodoxum Moore, Index Fil. cxiv. 1857.

Lygodictyon heterodoxum J. Smith, Ferns Brit. & For. 259. 1866.

Fronds several meters long; rhizome short-creeping, thickly clothed with short blackish few-celled flaccid hairs; stipe and rachis stramineous throughout, subterete, stoutish, up to 3 mm. in diameter; primary branches evident as mere protuberances upon the rachis or up to 5 mm. long, the terminal bud not invariably abortive; secondary (geminate) pinnae up to 50 cm. long, petiolate (3–6.5 cm.), rotund-ovate to pentagonal in outline, pinnate or at the base bipinnate, the rachis strongly flexuous, stramineous, narrowly marginate above; tertiary segments 2–4 pairs, nearly equal in length, the lowermost petiolate (1–4 cm.), cordate at the base, sometimes triangular and pinnate, bearing a pair of shorter alternate quaternary segments at the base, or subpalmately cleft into 3 or 4 elongate quaternary segments similar to the middle tertiary segments, these simple or dichotomously cleft, the divisions equal or unequal; upper tertiary segments mostly simple, falcate, the uppermost often joined to the terminal segment, this sometimes greatly elongate (up to 30 cm.) and either single or binate; middle tertiary segments (or their main divisions) in general linear-oblong, 10–20 cm. long, 1.5–3 cm. broad, or the fertile ones linear-lanceolate and narrower; costae stout, not nodose-articulate at the base, subflexuous, elevated; veins alternate, oblique, elevated, anastomosing, forming 4 or 5 ranks of areoles upon each side of the costa, the costal row unequally obdeltoid, the outer ones irregularly hexagonal, directed toward the margin; leaf-tissue rigidly herbaceous, lustrous upon both surfaces, slightly paler below, the veins and costae nearly glabrous, the margins obscurely crenulate-repand; sporangiophores up to 6 mm. long, close, sessile, serrate; spores verrucose.

TYPE LOCALITY: Oaxaca, Mexico.

DISTRIBUTION: Southern Mexico to Costa Rica; also in Venezuela.

ILLUSTRATION: Kunze, *Farrnkr. pl. 113*.

6. *Lygodium venustum* Sw. Jour. Bot. Schrad. 1801²: 503. 1803.

Primary rachis subterete, usually yellowish-stramineous, very narrowly marginate, up to 2.5 mm. in diameter, pubescent; primary branches up to 1 cm. long, densely pubescent, the terminal bud usually dormant; sterile secondary (geminate) pinnae petiolate (1.5–3 cm.), oblong or broadly oblong, 15–25 cm. long, 8–20 cm. broad, once-pinnate, acute or acuminate, the rachis nearly straight, densely pubescent, slightly alate toward the apex; tertiary segments 5–8 pairs, approximate or mostly apart, slightly smaller toward the apex, all but the uppermost stalked, deltoid-ovate from a cordate base, 4–10 cm. long, 1.5–4 cm. broad at the base, the costa nodose-articulate at the base and emitting a dichotomous branch upon either side, the segment thus subpalmately 5-lobed, the middle lobe greatly elongate, usually at least twice as long as the lateral, lanceolate to oblong-lanceolate, 1–1.8 cm. broad, acute or obtuse, the margin deeply crenate-serrate or sometimes pinnately lobed, the lobes or crenations close, denticulate-serrate; costae elevated, stout, nearly straight, excurrent to the apex, pilose or pubescent; veins commonly opposite, or subopposite, very oblique, elevated, subpinnately branched, the branches close, pilose or pubescent, the hairs of the lower surface usually much shorter; leaf-tissue herbaceous, usually subopaque, glabrous or short-pubescent. Fertile secondary (geminate) pinnae similar to the sterile or often bipinnate, the lower tertiary segments with shorter basal lobes or 1–3 pairs of short mostly opposite quaternary segments, the lowest of these inequilateral and often subpalmately lobed; sporangiophores solitary upon the mostly shallow lobes, serrate, up to 8 mm. long; spores minutely verrucose.

TYPE LOCALITY: Brazil.

DISTRIBUTION: Mexico and Central America, southward to Brazil and Peru; West Indies (not common).

ILLUSTRATION: Breyn, *Exot. Pl. Cent. pl. 96*.

7. *Lygodium mexicanum* Presl, Rel. Haenk. 1: 72. 1825.

Lygodium Schiedeianum Presl, Abh. Böhm. Ges. Wiss. V. 4: 370. 1845.

Lygodium commutatum Presl, Abh. Böhm. Ges. Wiss. V. 4: 370. 1845.

Rachis subterete, stramineous to yellowish-brown, very narrowly marginate, up to 2.5 mm. in diameter; primary branches 5–10 mm. long, sparingly pubescent; sterile secondary (geminate) pinnae petiolate (0.5–3 cm.), broadly ovate to deltoid-ovate, 15–28 cm.

long, 10–18 cm. broad, once-pinnate, acuminate, the rachis subflexuous, slightly or densely pubescent, foliaceous-marginate toward the apex; tertiary segments 5–8 pairs, approximate or apart, the upper ones gradually smaller, all but the uppermost petiolate, elongate deltoid-ovate or deltoid-lanceolate from a cordate base, the larger ones 3–9 cm. long, the costa not nodose-articulate at the base, emitting alternately upon each side a dichotomous branch, the segment thus subpalmately 5-lobed or by the further division of the branches rarely 7–9-lobed, the middle lobe invariably the longest, lanceolate to linear-oblong, 5–15 mm. broad, acutish or obtuse, crenate or closely and obtusely lobed, the margins bluntly or sharply denticulate; costae elevated, stoutish, usually flexuous, excurrent to the apex, pilose or often sparsely so below; costulae and veins alternate, the latter very oblique, repeatedly dichotomous or subpinnately branched, the branches close, sparingly pilose or often conspicuously so with numerous short hairs intermixed; leaf-tissue membrano-herbaceous, lustrous at least above, glabrate or minutely pilose. Fertile secondary (geminate) pinnae mostly equaling the sterile, bipinnate at the base or often so nearly throughout, the lower and middle tertiary segments oblong to narrowly deltoid, with 1–6 pairs of mainly alternate quaternary segments, the lowest of these inequilateral, often subpalmately lobed; sporangiophores solitary, serrate, up to 8 mm. long; spores minutely verrucose.

TYPE LOCALITY: Mexico.

DISTRIBUTION: Mexico and Central America generally, southward to Brazil.

ILLUSTRATIONS: Ettingsh. Farnkr. *pl.* 170, *f.* 7, 8; *pl.* 174, *f.* 1, 11.

8. *Lygodium cubense* H.B.K. Nov. Gen. & Sp. 1: 31. 1815.

Lygodium Poeppigianum Presl, Abh. Böhm. Ges. Wiss. V. 4: 363. 1845.

Rhizome creeping, slender, blackish, clothed with short dark-brown hairs; stipe 2 mm. in diameter, subterete, narrowly marginate, light-brownish or dull-stramineous from a darker hispid base; primary branches evident only as short protuberances upon the primary rachis, the terminal bud low-rotund, clothed with cinnamomeous hairs, usually dormant; sterile secondary (geminate) pinnae petiolate, in small forms linear with a single segment or binate, but usually rhombic-ovate and pinnate or subbipinnate, 10–20 cm. long and broad, the rachis strongly divaricate-flexuous, marginate, coarsely pubescent; tertiary segments 1 or 2 pairs, the upper ones linear to linear-lanceolate, petiolate or subsessile from a strongly inequilateral base, the lower side cordate, the upper cuneate, the terminal segment similar or joined to the next below, all acute or acutish, 3–13 cm. long, 3–13 mm. broad, the basal segments binate or pinnate with a single pair of quaternary segments, all similar to the upper tertiary segments; costae nodose-articulate, pubescent above, sparingly pilose below, strongly elevated, stout, extending to the apex; veins very oblique, curved, 1–4 times dichotomous, elevated, bearing a few scattering hairs above; leaf-tissue rigidly coriaceous, striate, above light- or yellowish-green, lustrous, below paler and less lustrous, whitish-glandular below (often conspicuously so), the margins a little thickened, obscurely crenate-serrulate. Fertile secondary (geminate) pinnae bipinnate or at the base subtripinnate; tertiary segments 3–4 pairs, mostly shorter than the sterile, the upper ones cuneate, deltoid-lanceolate, the middle pinnate at the base with small obdeltoid or subrhombic quaternary segments, the lowermost bipinnate at the base, the quaternary segments similar to the anterior tertiary segments; sporangiophores distant, single upon the oblique crenations, serrate, mostly 3–8 mm. long, pilose on the midvein above and at the base below, also upon the indusia; spores coarsely low verrucose-tuberculate.

TYPE LOCALITY: Near Havana, Cuba.

DISTRIBUTION: Known only from Cuba, apparently common.

ILLUSTRATION: Ettingsh. Farnkr. *pl.* 169, *f.* 2, 7.

9. *Lygodium oligostachyum* (Willd.) Desv. Mém. Soc. Linn.

Paris 6: 205. 1827.

Hydroglossum oligostachyum Willd. Sp. Pl. 5: 81. 1810.

Lygodium gracile Baker, Jour. Bot. 26: 35. 1888.

Fronds apparently about 2 meters long; rhizome short-creeping, blackish; stipe dull-brownish from a darker base, about 1 mm. in diameter, the rachis similar, subterete, very

narrowly marginate, rusty-puberulous, soon glabrescent; primary branches very short, knob-like, the terminal bud relatively large, usually abortive, closely invested with rusty hairs; sterile secondary (geminant) pinnae 12–30 cm. long, deltoid-ovate, inequilateral, bipinnate or at the base tripinnate, the rachis divaricate-flexuous; tertiary segments 2–4 pairs, 2–5.5 cm. apart on each side, petiolate (1–2.3 cm.), gradually smaller toward the acuminate apex, the terminal segment lanceolate or narrowly subhastate from an unequally cuneate or obliquely lobate base, usually 3–5 cm. long, 1 cm. or less broad at the base, the middle segments mostly trifoliate, the divisions similar to the terminal segment; lowermost tertiary segments up to 13 cm. long, rhombic-deltoid, with about 3 pairs of very distant quaternary segments, these similar to the terminal tertiary segment, the lowermost often with a smaller conform free segment, distinctly stalked (5 mm.), the rachis strongly flexuous, delicately foliaceous-marginate; costules elevated, flexuous, extending to the apex; veins very oblique, 1–2 times dichotomous, or in the single basal lobes subpinnate-flabellate; leaf-tissue membranous-herbaceous, bright clear green above, paler below, essentially glabrous, the margins everywhere marked by shallow crenations, these serrulate-dentate. Fertile secondary (geminant) pinnae similar in size, at least bipinnate, always tripinnate at the base, the quaternary segments elongate-deltoid with the basal divisions short, narrowly cuneate, sessile or short-stalked, and often cleft nearly to the base into 2 unequal divisions; ultimate segments all deeply and very obliquely incised toward the base, above strongly serrate; sporangiophores usually single and terminal upon the lobes, oblong, up to 5 mm. long, obscurely pilose upon both surfaces; spores lightly tuberculate, the surfaces smooth.

TYPE LOCALITY: Near Lake Miragoâne, Haïti.

DISTRIBUTION: Known only from the island of Santo Domingo.

ILLUSTRATION: Plumier, *Traité Foug. pl. 92*.

2. *ACTINOSTACHYS* Wall. ; Hook. Gen. Fil. *pl. 111, A.* 1842.

Fronds simple, linear, mostly triquetrous or flattish from a dark terete or semi-terete base, prominently uncostate. Sporangioophores terminal, the divisions elongate, spuriously digitate in a penicillate tuft from a very short inconspicuous prolongation of the costa. Sporangia in 2 rows, one upon each side of the costa, but apparently in 4 more or less complete rows by the bending of the crowded sori alternately to left and right; indusium continuous, formed of the narrowly reflexed margin of the segments.

Type species, *Acrostichum digitatum* L.

Fronds 5–20 cm. long; fertile segments 3–8, 8–20 mm. long.

Fronds 25–55 cm. long; fertile segments 6–14, 2–4.5 cm. long.

1. *A. Germani*.

2. *A. Pennula*.

1. *Actinostachys Germani* Fée, *Mém. Foug. 11* : 123. 1866.

Schizaea Germani Prantl, *Schiz. 132*. 1881.

Plants from roundish or oblong-ovoid bristly tubers 1 cm. or less long (these sunk 9–12 cm. in a substratum of humus or decayed wood), sessile or distant 1–3 cm. upon a slender ascending tortuous offshoot; fronds one or several, very slender, 5–20 cm. long, terete or angled at the dark castaneous base, above strongly costate on the under surface, thus triquetrous, in the upper part flattish, about 1 mm. broad, glabrous; fertile segments 3–8, closely penicillate, subequal, 8–20 mm. long, slender, acuminate, the costa conspicuously pilose below; sporangia in 2 rows, usually appearing to be in 4; spores delicately maculate.

TYPE LOCALITY: Sainte-Rose, Petit-Bourg, Guadeloupe.

DISTRIBUTION: Everglade Keys of Florida, growing upon decayed wood in hammocks; Guadeloupe.

ILLUSTRATION: Fée, *loc. cit. pl. 29, f. 3*.

2. *Actinostachys Pennula* (Sw.) Hook. Gen. Fil. *pl. 111, A.* 1842.

Schizaea Pennula Sw. *Syn. Fil. 150, 379*. 1806.

Schizaea trilobalis Schkuhr, *Krypt. Gew. 1* : 137. 1809.

Acrostichum Pennula Poir. in *Lam. Encyc. Suppl. 1* : 125. 1810.

Actinostachys trilobalis J. Smith, *Lond. Jour. Bot. 1* : 202. 1842.

Fronds numerous, closely fasciculate from a small ascending rhizome, stout, 25–50 cm. long, strongly triquetrous toward the dark castaneous base and usually buried a distance of

2-10 cm. in the substratum, above green and gradually flattish, lightly canaliculate upon the upper surface, about 2 mm. broad, strongly and often sharply costate below, thus unequally triquetrous nearly throughout, lustrous, glabrous; fertile segments 6-14, penicillate, 2-4.7 cm. long, 1 mm. or more broad, acuminate, at first erect and close, eventually subfalcate and divergent, unequal, the uppermost and lower ones shorter than the middle ones and sometimes dichotomous; sporangia very numerous, spuriously biseriate upon each side of the conspicuously rusty-pilose costa; spores closely and delicately maculate.

TYPE LOCALITY: Tropical America.

DISTRIBUTION: Costa Rica; Guadeloupe; also Trinidad to Uruguay.

ILLUSTRATIONS: Hook. *loc. cit.*; Schkuhr, *loc. cit. pl. 136*; Hook. & Grev. *Ic. Fil. pl. 54*; Duperrey, *Voy. pl. 27* (as *S. penicillata*).

3. SCHIZAEA Smith, Mém. Acad. Turin 5: 419. 1793.

Fronds usually numerous, cespitose, erect or ascending (or the sterile ones recurved or tortuous), simple, linear or filiform, terete at the base, above flat or flattish (rarely semiterete), unicostate, or in a few species once or several times dichotomous, the divisions slender, elongate, unicostate, distant, scarcely divaricate, never forming a definite lamina. Sporangioophores terminal, the segments (5-23 pairs) pinnately arranged upon a rachiform continuation of the costa and not exceeding it in length, often much shorter. Sporangia in 2 close rows along the costa of the segments, partially protected by the narrowly reflexed indusiiform margin.

Type species, *Acrostichum pectinatum* L.

1. Schizaea pusilla Pursh, Fl. Am. Sept. 657. 1814.

Plants densely fasciculate, the rhizomes minute and short-creeping; fronds linear, the sterile ones numerous and intricately entangled, 2-7 cm. long, about 0.5 mm. broad, ascending, recurved and tortuous, flattish and slightly concave above, convex below, finely striate; fertile fronds rigidly erect, 4-15 cm. long, far exceeding the sterile fronds, a little thicker, straight or flexuous; sporangioophore ovate, conduplicate, the segments (3-8 pairs) oblique, 4-9 mm. long, linear-oblong, obtuse, strongly concave (the apex cucullate), the upper ones greatly reduced, the costa and margins rusty-pilose; sporangia close, 4-9 pairs; spores minutely areolate.

TYPE LOCALITY: New Jersey.

DISTRIBUTION: Pine barrens of central and eastern New Jersey, usually in sphagnum; Nova Scotia; Newfoundland.

ILLUSTRATIONS: Hook. & Grev. *Ic. Fil. pl. 48*; D. C. Eaton, *Ferns N. Am. pl. 24, f. 3*; Britt. & Brown, *Ill. Fl. f. 12*.

4. LOPHIDIUM Rich. Act. Soc. Hist. Nat. Paris 1: 114. 1792.

Fronds cespitose, erect, stipitate, once to repeatedly dichotomous, the divisions usually numerous, linear and flattish, or broader and conspicuously foliose, unicostate or pluricostate, forming a definite flabelliform lamina. Sporangioophores terminal upon the excurrent costae of the leafy divisions or rarely upon special nonfoliose fronds of similar form; fertile segments simple or dichotomous, borne in a pinnate spike, not longer than the rachis of the sporangioophore. Sporangia in two rows close to the costa, crowded, somewhat protected by the recurved indusiiform margin.

Type species, *Lophidium latifolium* Rich.

Fronds similar.

Fronds stout, rigidly erect; segments numerous, mostly 1-3 cm. broad.

Fronds weak, slender; segments few, 1-3 mm. broad.

Fronds strongly dimorphous.

1. *L. elegans*.

2. *L. fluminense*.

3. *L. Poeppigianum*.

1. Lophidium elegans (Vahl) Presl, Abh. Böhm. Ges.

Wiss. V. 4: 337. 1845.

Acrostichum elegans Vahl, *Symb. 2: 104*. 1791.

Lophidium latifolium Rich. *Act. Soc. Hist. Nat. Paris 1: 114*. 1792.

Schizaea elegans Smith, *Mém. Acad. Turin 5: 419*. 1793.

? *Schizaea Flabellum* Mart. *Ic. Crypt. Bras. 115*. 1834.

? *Lophidium Flabellum* Presl, *Abh. Böhm. Ges. Wiss. V. 4: 337*. 1845.

Rhizome ascending or horizontal, closely covered with yellowish-brown hairs; fronds several, fasciculate, 25–70 cm. long, rigidly erect; stipes stoutish, obtusely angled, sulcate and brownish in the lower part, lighter and marginate above; lamina abruptly expanded, broadly obdeltoid or suborbicular in outline, 10–20 cm. long, 15–30 cm. broad, 2–6 times dichotomously cleft or incised, the divisions variable, linear-oblong or linear to narrowly obdeltoid, pluricostate, the apices deeply and usually irregularly fimbriate-dentate or sharply lacerate by the production of the prominent costae; sporangiophores numerous, terminal upon many of the elongate costae, recurved, conduplicate or with age diffuse, 6–10 mm. long; fertile segments 10–15 pairs, slender, the lower ones 2.5–5 mm. long, the upper ones gradually shorter, obtuse, conspicuously pilose upon the costa and margins; spores delicately and minutely verrucose.

TYPE LOCALITY: Trinidad.

DISTRIBUTION: Southern Mexico and Central America; Jamaica; Santo Domingo (rare); also in South America.

ILLUSTRATIONS: Vahl, *Symb. pl.* 50; ? Mart. *Ic. Crypt. Bras.* *pl.* 55, *f.* 2; ? Ettingsh. *Farnkr. pl.* 175, *f.* 1; E. & P. *Nat. Pfl.* 14: *f.* 193, *C, D.*

2. *Lophidium fluminense* (Miers) Underwood.

Schizaea fluminensis Miers; Sturm, in Mart. *Fl. Bras.* 12: 184. 1859.

Rhizome slender, horizontal, densely rusty-pilose; fronds 1–3, erect or ascending, 4–30 cm. long; stipe 3–24 cm. long, the lower portion to a distance of 3–15 cm. usually brownish and tortuous from being buried in humus, the upper portion flattish, slender, stramineous, at the summit greenish-marginate, passing gradually into the lamina, sparingly pilose; lamina narrowly obdeltoid in outline, narrowly cuneate, 2–7.5 cm. long, 1.5–4 cm. broad, 2 or 3 times dichotomous (rarely simple), the segments obliquely ascending, 1–3 mm. broad, unicostate or, if bicostate, cleft at the summit, each costa produced and developing a sporangiophore; sporangiophores 6–15 mm. long, incurved, conduplicate; fertile segments 7–14 pairs, slender, linear, pilose along the costae and margins, the lower and middle ones about equal, the upper ones shorter; spores delicately verrucose.

TYPE LOCALITY: Near Panurê, by the Rio Uaupês, Brazil.

DISTRIBUTION: Grenada and Jamaica, rare; also in Brazil, and reported from Guiana and Bolivia.

ILLUSTRATION: Mart. *Fl. Bras.* 12: *pl.* 15, *f.* 2.

3. *Lophidium Poeppigianum* (Sturm) Underwood.

Schizaea Poeppigiana Sturm, in Mart. *Fl. Bras.* 12: 181. 1859.

Schizaea occidentalis Griseb. *Cat. Pl. Cuba* 273. 1866.

Rhizome relatively stout, short-creeping, densely clothed with lustrous castaneous hairs; fronds fasciculate, erect, the fertile ones usually far surpassing the sterile. Sterile fronds erect, 15–30 cm. long; stipes pilose, dull-stramineous from a darkish base, concave-marginate along the anterior face, convex below; lamina orbicular (the divisions spreading), 10–12 cm. broad, in drying conduplicate and broadly obdeltoid, 5–8 times dichotomous, the ultimate divisions linear, 1–2 mm. broad, acutish, unicostate, the costa elevated above, scarcely so below, the margins thickened and conspicuously scabrous at the upper surface. Fertile fronds stouter, 30–50 cm. long, 3 or 4 times dichotomous, the ultimate divisions slender; sporangiophores strongly incurved (straight at first), 1.5–2 cm. long, conduplicate, the segments (15–25 pairs) slender, the middle ones distinctly the longest, the margins and costae pilose; spores delicately and very minutely verrucose.

TYPE LOCALITY: Ventanilla de Cassapillo, Peru.

DISTRIBUTION: Eastern Cuba; also from Costa Rica to Peru and British Guiana.

5. ANEMIA¹ Sw. *Syn. Fil.* 6, 155. 1806.

Ornithopteris Bernh. *Neues Jour. Bot. Schrad.* 12: 40. 1806.

Anemidictyon J. Smith; Hook. *Gen. Fil.* *pl.* 103. 1842.

Trochopteris Gardn. *Lond. Jour. Bot.* 1: 74. 1842.

Coptophyllum Gardn. *Lond. Jour. Bot.* 1: 133. 1842.

Aneimidictyum Presl, *Abh. Böhm. Ges. Wiss. V.* 4: 351. 1845.

Anemirhiza J. Smith, in Seemann, *Bot. Voy. Herald* 243. 1854.

Aneimiaebotrys Fée, *Crypt. Vasc. Brés.* 1: 267. 1869.

Fronds either in several ranks and cespitose upon a horizontal or ascending rhizome-

¹ Often written *Aneimia*, here regarded as a variant spelling.

or distichous and dorsal upon a creeping rhizome, mostly erect or ascending, the laminae mostly free-veined, pinnatifid to pinnately decomposed, some of them wholly fertile (the fronds thus dimorphous), or with only the basal pair of pinnae fertile, these usually elongate and erect or nearly so, commonly surpassing the sterile portion of the lamina; sporangia borne in a close single row upon either side of the ultimate divisions of the fertile pinnae, these usually either very slender and semi-terete (the sporangia thus non-indusiate), or narrowly foliose and functioning as indusia; spores triplanate.

Type species, *Osmunda Phyllitidis* L.

Fronds in several ranks, only the basal pinnae fertile.

Fertile pinnae at or near the base of the sterile lamina; indusium wanting.

Veins anastomosing or casually connivent.

Veins copiously anastomosing, the areoles ample; pinnae rounded at the base.

1. *A. Phyllitidis*.

Veins mostly free, casually connivent; pinnae smaller, mostly cuneate.

2. *A. Underwoodiana*.

Veins invariably free.

Pinnae not incised.

Sterile lamina obtuse or truncate, less than 10 cm. long.

Stipes of fertile fronds much shorter than the sterile fronds.

3. *A. humilis*.

Stipes of fertile fronds mostly surpassing the sterile fronds.

Leaf-tissue rigidly coriaceous, lustrous above; margins subentire or undulate.

4. *A. oblongifolia*.

Leaf-tissue membranous, opaque; margins denticulate-crenate.

5. *A. obovata*.

Sterile lamina acutish to acuminate, usually more than 10 cm. long.

Sterile lamina of a deltoid type; leaf-tissue long-pilose, especially above.

6. *A. hirta*.

Sterile lamina oblong-lanceolate; leaf-tissue glabrate or minutely hispid above.

Sterile lamina about 17 cm. long, 5.5 cm. broad, shorter than the fertile pinnae.

7. *A. affinis*.

Sterile lamina 27-29 cm. long, 9 cm. broad, much longer than the fertile pinnae.

8. *A. Donnell-Smithii*.

Pinnae (at least the lower ones) incised, cleft, or pinnatifid.

Pinnae deeply cleft, the segments distant and narrow.

9. *A. hirsuta*.

Pinnae crenately incised or lobed, the lobes often shallow.

Pinnae narrowly oblong to oblong-lanceolate, the lower ones lightly crenately incised.

10. *A. pastinacaria*.

Pinnae broadly oblong to rhombic-ovate, the lower ones crenately lobed.

11. *A. jaliscana*.

Fertile pinnae borne distinctly below the base of the sterile lamina; indusiate.

Fertile pinnae flattish, *i. e.*, the divisions not paniculate.

Plants small, less than 5 cm. high.

12. *A. Brandegei*.

Plants 50 cm. or more high.

13. *A. aspera*.

Fertile pinnae greatly altered, the divisions paniculate.

Pinnules of the sterile frond mostly anadromous, only those of the upper third of the lamina catadromous.

Pinnules very obliquely incised or pinnatifid, the segments numerous, narrow, acute, serrate or pinnately incised.

14. *A. anthriscifolia*.

Pinnules pinnately parted, the segments fewer, broader, obtuse, crenate or crenately lobed.

15. *A. guatemalensis*.

Pinnules of the sterile frond mostly catadromous, only those of the basal pinnae anadromous.

Stipe and rachis light-stramineous; fertile pinnae ascending, much shorter than the sterile lamina.

16. *A. Rosei*.

Stipe and rachis fuscous-stramineous; fertile pinnae erect, surpassing the sterile lamina.

17. *A. Karwinskyana*.

Fronds distichous, dorsal, dimorphous, or, if only the basal pinnae fertile, these remote from the sterile lamina; indusiate.

Fronds dimorphous, *i. e.*, wholly fertile or sterile.

Small or slender plants, the leaf-tissue firmly membranous.

Sterile lamina bipinnate only at the base; segments narrowly obovate, long-cuneate.

18. *A. Wrightii*.

Sterile lamina bipinnate or tripinnatifid; segments rhombic-ovate to rhombic-oblong.

19. *A. cicutaria*.

Stouter plants, the leaf-tissue rigidly coriaceous.

Segments subentire or nearly so; fertile fronds 10-22 cm. long.

20. *A. portoricensis*.

Segments sharply inciso-denticulate; fertile fronds 25-45 cm. long.

21. *A. aurita*.

Fronds not dimorphous, *i. e.*, only the basal pinnae fertile.

Sterile lamina simply pinnate.

Leaf-tissue membrano-chartaceous, the veins elevated on both

- surfaces; fertile pinnae exceeding the sterile lamina, often greatly so. 22. *A. mexicana*.
 Leaf-tissue very coriaceous, the veins impressed above; fertile pinnae invariably shorter than the sterile lamina, usually much so. 23. *A. speciosa*.
 Sterile lamina at least bipinnatifid at the base.
 Pinnae remote, strongly ascending, the pinnules and segments very oblique and slender; tissue rigidly herbaceous. 24. *A. cuneata*.
 Pinnae contiguous, spreading, the pinnules or segments spreading and broader; tissue coriaceous.
 Sterile lamina bipinnatifid or (rarely) bipinnate at the base, 5 cm. or less long. 25. *A. coriacea*.
 Sterile lamina bipinnate to quadripinnatifid, much larger. 26. *A. adiantifolia*.

1. *Anemia Phyllitidis* (L.) Sw. Syn. Fil. 155. 1806.

Osmunda Phyllitidis L. Sp. Pl. 1064. 1753.

Anemia longifolia Raddi, Pl. Bras. 1: 69. 1825.

Anemia cordifolia Presl, Rel. Haenk. 1: 73. 1825.

Anemia Haenkii Presl, Rel. Haenk. 1: 74. 1825.

Anemidictyon Phyllitidis J. Smith, in Hook. Gen. Fil. pl. 103. 1842.

Aneimidictyum Haenkii Presl, Abh. Böhm. Ges. Wiss. V. 4: 354. 1845.

Aneimidictyum Haenkii cordifolium Presl, Abh. Böhm. Ges. Wiss. V. 4: 354. 1845.

Rhizome ascending; fronds several, fasciculate, the stipe of the fertile fronds sometimes surpassing the sterile fronds, rarely much so. Fertile fronds (including the elongate fertile pinnae) 25–70 cm. long; stipe 15–48 cm. long, usually much longer than the sterile lamina, rusty fibrillose-villous, sometimes thickly so, commonly glabrescent with age, stramineous, sulcate; sterile lamina broadly ovate-oblong to orbicular, 7–28 cm. long, 8–25 cm. broad, simply pinnate, the rachis similar to the stipe; pinnae 2–7 pairs, approximate or rarely apart, somewhat ascending (or the lower ones spreading), sessile or mostly short-petiolate, subequal, or in odd-pinnate fronds the upper ones gradually smaller; lower pinnae 4–14 cm. long, 1.5–3.5 cm. broad, ovate to ovate-lanceolate or lanceolate, acute or acuminate, often attenuate, mostly falcate or subfalcate, at the base subequally rounded, less commonly subcordate or truncate, above the base inequilateral, the lower side the broadest, the costa stout, yellowish, excurrent to the apex, rusty-pilose; succeeding pinnae similar, the upper ones usually cuneate or even excavate at the upper side of the base, rounded below, the uppermost sometimes semi-adnate below; terminal pinna (if present) usually a little larger than the next below, truncate or inequilateral at the base, rarely joined to 1 or 2 below; veins slightly elevated above, usually subimmersed below, copiously anastomosing, the areoles ample, elongate, oblique; leaf-tissue herbaceo-subcoriaceous, somewhat lustrous above, paler and minutely glandular below, rigidly and sparingly pilose among and upon the veins both above and below, usually glabrescent; margins crenulate to irregularly dentate, delicately cartilaginous, whitish; fertile pinnae 8–34 cm. long, usually exceeding the sterile lamina (often much so), the panicle commonly as long as the stalk or longer, the branches usually close, with very numerous copiously fertile segments; spores striate, echinulate. Sterile fronds smaller than the fertile, often only one half as long, rarely up to 65 cm. long; lamina similar to that of the fertile frond.

TYPE LOCALITY: Santo Domingo.

DISTRIBUTION: Greater Antilles (not common); Mexico and Central America generally; also in South America.

ILLUSTRATIONS: Plumier, *Traité Foug.* pl. 156; Raddi, Pl. Bras. 1: pl. 8; Presl, Rel. Haenk. 1: pl. 11, f. 3 (as *A. cordifolia*); Hook. *loc. cit.*; Lowe, *Ferns Brit. & Exot.* 8: pl. 71; J. Smith, *Ferns Brit. & For.* f. 144; E. & P. Nat. Pfl. 14: 370, f. 198, A.

2. *Anemia Underwoodiana* Maxon, sp. nov.

Rhizome relatively small, erect, the fronds few and closely clustered, the stipe of the fertile fronds equaling or scarcely equaling the sterile fronds. Fertile fronds 20–35 cm. long; stipe 12–18 cm. long, rusty fibrillose-pilose, thickly so at first, stramineous, darker at the base, sulcate; sterile lamina deltoid to broadly ovate-deltoid, 7–16 cm. long, 7–14 cm. broad, simply pinnate, acuminate, the rachis compressed and densely rusty-pilose; pinnae 3–7 pairs, approximate, contiguous or somewhat imbricate, ascending or the lowermost spreading, these the largest, sessile, oblong-lanceolate, attenuate, subequally and broadly cuneate or sometimes slightly rounded at the upper side; upper pinnae gradually

shorter, more narrowly cuneate, essentially equilateral, lanceolate, the uppermost 2 or 3 usually confluent, forming a deeply lobed or parted acuminate terminal segment; leaf-tissue papyraceo-membranous, livid-green and lustrous above, a little paler below, pellucid, minutely glandular below, rusty pilose-scabrous upon both surfaces, mainly along the veins and nearly median midvein; veins elevated above, apparent below, close, very oblique, repeatedly dichotomous, mostly free, casually connivent; margins unevenly crenulate-undulate, slightly thickened; fertile pinnae 14–18 cm. long, equaling or slightly exceeding the sterile lamina, the panicle nearly as long as the slender rusty-pilose stalk, the divisions short, the basal ones distant; spores striate, echinulate. Sterile fronds shorter than the fertile, otherwise similar, the lamina and the stipe about equal in length.

Type collected near Castleton, Jamaica, altitude about 150 meters, April, 1903, *Underwood 1971* (herb. N. Y. Bot. Gard.).

DISTRIBUTION: Jamaica, Cuba, and Haïti, common, from near sea level up to 900 meters or more.

3. *Anemia humilis* (Cav.) Sw. Syn. Fil. 156. 1806.

Osmunda humilis Cav. Ic. 6: 69. 1801.

Anemia pilosa Mart. & Gal. Mém. Acad. Brux. 15⁵: 19. 1842.

Anemia Seemannii Hook. Lond. Jour. Bot. 7: 564. 1848.

Anemia oblongifolia humilis Hook. & Baker, Syn. Fil. 431. 1868.

Rhizome ascending or decumbent, stout; fronds closely fasciculate, the stipes of the fertile fronds usually much shorter than the sterile fronds. Fertile fronds (including the greatly elongate fertile pinnae) 10–30 cm. long; stipe 1–7 cm. long, stramineous, strongly arcuate at the base, sparsely villous above, finally glabrate; sterile lamina obovate-oblong to obovate or rarely oblong, 1–7 cm. long, 1–3 cm. broad, obtuse, once-pinnate, the rachis similar to the stipe; pinnae 2–9 pairs, spreading or the lower ones slightly deflexed and the upper a little ascending, the terminal usually larger than those next below, broadly rotund or deltoid from a cuneate base; middle pinnae contiguous or subimbricate, trapezoid-oblong, inequilateral, cuneate at the base below, rounded-truncate at the base above and close to the rachis; basal pinnae shorter, rounded-ovate from a cordate base; leaf-tissue rigidly membrano-coriaceous, usually lustrous above, opaque and paler below, conspicuously pilose and sparsely glandular upon both surfaces, often scabrous above from the tuberculate bases of the stiffish antrorse yellowish-white hairs; margins thickish, crenulate; fertile pinnae greatly elongate, 9–23 cm. long, far surpassing the sterile lamina, the stalk slender, 3–5 times as long as the panicle, stramineous, sparsely villous or glabrate, the panicle usually dense, the inferior segments often remote; spores narrowly striate, echinulate toward the angles. Sterile fronds rosulate, very short-stipitate; lamina 2–9 cm. long, 1–3.5 cm. broad, narrowly obovate or obovate-oblong; pinnae 2–9 pairs, close, the lower ones much reduced and broadly cuneate.

TYPE LOCALITY: Island of Taboga, Panama.

DISTRIBUTION: Mexico and Central America to Colombia, Venezuela, and Brazil.

ILLUSTRATIONS: Cav. Ic. *pl.* 592, *f.* 3; Mart. & Gal. *loc. cit.* *pl.* 2, *f.* 1; Hook. *loc. cit.* *pl.* 16; Schkuhr, Krypt. Gew. *pl.* 141.

4. *Anemia oblongifolia* (Cav.) Sw. Syn. Fil. 156. 1806.

Osmunda oblongifolia Cav. Ic. 6: 69. 1801.

Rhizome oblique; fronds fasciculate, the stipes of the fertile fronds mostly surpassing the sterile fronds. Fertile fronds (including the elongate fertile pinnae) 9–30 cm. long; stipe 5–13 cm. long, stoutish, sulcate, dark-stramineous, sparsely villous, glabrate; sterile lamina oblong, obtuse, 4–7 cm. long, 1.5–2.8 cm. broad, once-pinnate, the rachis similar to the stipe; pinnae 6–12 pairs, contiguous or apart, spreading, sessile, the middle ones trapezoid-oblong, obtuse, narrowly rounded-cuneate below, rounded-truncate above and contiguous to the rachis, the lower ones similar but a little shorter, inequilateral, exciso-cuneate below, the terminal pinna as large as those next below (or larger), cuneate, the outer portion rotund or sharply truncate; leaf-tissue coriaceous, lustrous above, opaque and paler below, more or less pilose, sparsely glandular below; margins thickened, repand, subentire or undulate; fertile pinnae elongate, 12–20 cm. long, far exceeding the sterile lamina, the stalks slender or stoutish, 3–4 times as long as the panicle, the panicle dense, the lower

segments usually remote; spores broadly striate, not echinulate. Sterile fronds with stoutish stipes, spreading; lamina oblong, 3.5-7 cm. long, 1.5-3 cm. broad; pinnae 5-13 pairs, spreading, similar to those of the sterile lamina of the fertile frond.

TYPE LOCALITY: Panama.

DISTRIBUTION: Panama; also in Colombia and Brazil.

ILLUSTRATIONS: Cav. Ic. *pl.* 592, *f.* 2; Schkuhr, *Krypt. Gew. pl.* 141; Ettingsh. *Farnkr. pl.* 172, *f.* 12.

5. *Anemia obovata* (Underw.) Maxon, sp. nov.

Ornithopteris obovata Underwood, MS.

Rhizome decumbent, relatively stout; fronds cespitose, the stipes of the fertile fronds scarcely or considerably surpassing the sterile fronds. Fertile fronds (including the fertile pinnae) 8-21 cm. long; stipe 5-13 cm. long, very slender, deeply sulcate, rusty-pilose, stramineous throughout or darker at the base; lamina ovate or oblong-ovate, 3-6 cm. long, 2.5-4.2 cm. broad, obtuse, once-pinnate, the rachis slight, rusty-pilose or glabrate; pinnae 2-4 pairs, opposite, approximate, spreading, the lowermost sessile, elliptic-oblong, unequally cuneate, those above narrower, subsessile, symmetrical, the uppermost narrowly obovate and semiadnate, the terminal segment much longer, obovate, cuneate, simple or deeply bilobed; margins thickened, unequally denticulate-crenulate, not lobed; leaf-tissue membranous, opaque, dull-greenish above, glabrate or very sparingly pilose above, below glabrous and minutely glandular; veins elevated above, scarcely so below; fertile pinnae 3.5-8.5 cm. long, easily surpassing the sterile lamina, the closely branched panicle shorter than the slender stalk; spores broadly striate, echinulate. Sterile fronds 5-10 cm. long, the lamina as long as the stipe, similar to that of the fertile frond.

Type collected in Cuba, 1865, *Wright 3933* in part (herb. N. Y. Bot. Gard.), the other portion of the number being *A. pastinacaria* Moritz.

DISTRIBUTION: Known only from the type number.

6. *Anemia hirta* (L.) Sw. Syn. Fil. 155. 1806.

Osmunda hirta L. Sp. Pl. 1064. 1753.

? *Anemia abscissa* Schrad. Gött. Gel. Anz. 1824: 864. 1824.

Anemia Breuteliana Presl, Abh. Böhm. Ges. Wiss. V. 4: 350, as to type (excl. syn. and plate cited). 1845.

Aneimadictyum hirtum Presl, Abh. Böhm. Ges. Wiss. V. 4: 352, in part. 1845.

Rhizome ascending, stoutish; fronds 3-6, fasciculate, mostly fertile, the stipe of the fertile fronds scarcely exceeding the sterile fronds. Fertile fronds 20-35 cm. long; stipe 13-21 cm. long, stoutish, dull-stramineous, canaliculate, densely rusty-villous; lamina deltoid to broadly ovate-deltoid, 8-15 cm. long, 6-11 cm. broad, once-pinnate, acute, the rachis subflexuous, clothed like the stipe; pinnae 6-13 pairs, approximate or contiguous, spreading, the lowermost the largest, sometimes deflexed, short-petiolate, strongly inequilateral at the base, widely exciso-cuneate below, truncate and rounded above, obliquely lanceolate, broadest above the middle (up to 2 cm.), acute, the margin minutely and irregularly crenulate, slightly thickened; succeeding pinnae gradually smaller, short-petiolate, only the uppermost narrowly adnate, oblong-spatulate, finally confluent at the acuminate or subcaudate apex; leaf-tissue membrano-papyraceous, dull-greenish, paler below; veins prominent above, subimmersed below, pilose upon both surfaces but especially above; fertile pinnae 8-17 cm. long, slightly surpassing the sterile lamina, the stalks about one-half longer than the close panicle, pilose; spores striate-cristate, echinulate. Sterile fronds few, similar to the fertile, the lamina slightly larger.

TYPE LOCALITY: Near Leogane, Haïti.

DISTRIBUTION: Haïti, Porto Rico, St. Kitts, Guadeloupe, and Martinique; also in South America?

ILLUSTRATION: Plumier, *Traité Foug. pl.* 157.

Note.—The Porto Rican specimens average about one-half smaller than the measurements given in the description.

7. *Anemia affinis* Baker, in Hook. & Baker, Syn. Fil. ed. 2. 525. 1874.

Rhizome apparently horizontal; fronds few, fasciculate, erect, the stipe of the fertile fronds scarcely exceeding the sterile fronds. Mature fertile fronds (including the greatly

elongate fertile pinnae) 45–60 cm. long; stipe 28–38 cm. long, slender, subflexuous, stramineous, naked; sterile lamina oblong-lanceolate, acutish, about 17 cm. long and 5.5 cm. broad, the rachis slender, flexuous; pinnae about 8 pairs, approximate or mostly apart, spreading, inequilateral, oblong to oblong-oval, obliquely exciso-cuneate below at the base, obtusely truncate above, the apex obtuse, the margins with an occasional crenation, otherwise irregularly fimbriate-crenulate, scarcely thickened; upper pinnae gradually smaller, the uppermost relatively narrower, very oblique, confluent at the slender apex; leaf-tissue papyraceous, dull-greenish and hispid with very short brownish hairs above, below slightly paler, glabrate and very minutely glandular, appearing pustulate by the contraction of the veins in drying; veins elevated above, scarcely so below; fertile pinnae 18–23 cm. long, erect or ascending, surpassing the sterile lamina, the panicle laxly short-branched, nearly glabrous, much shorter than the slender subflexuous stalk. Sterile fronds similar but shorter, the stipe relatively much shorter.

TYPE LOCALITY: Sierra Madre of northwestern Mexico.

DISTRIBUTION: Known only from the original specimens (*Seemann 1951*).

8. *Anemia Donnell-Smithii* Maxon, sp. nov.

Rhizome and sterile fronds wanting. Fertile fronds ample, the sterile lamina as long as the stipe or longer; stipe relatively very slender, 20–25 cm. long, canaliculate, dark-stramineous, sparsely rusty-pilose, especially toward the base; sterile lamina oblong-lanceolate, acutish, 27–29 cm. long, 9 cm. broad near the base, once-pinnate, the rachis slender, rusty pilose, glabrescent; pinnae about 14 pairs, approximate or contiguous, spreading, the lower ones about 4.5–5 cm. long, 2–2.5 cm. broad, opposite, rectangular-oval from an unequally and narrowly cuneate base, the upper side less oblique than the lower at the base, the apex obtuse, the margins finely and unequally fimbriate-crenulate, slightly thickened; upper pinnae very gradually smaller, alternate, all but the uppermost sessile, these ascending, semiadnate, spatulate, slightly decurved, greatly reduced, finally confluent and forming a slender lobed subcaudate terminal segment; leaf-tissue papyraceo-membranous, above dark-green, glabrous or with a few very short minute hairs between the elevated veins, below lighter, glabrous, minutely and sparingly glandular, the veins immersed; fertile pinnae 11–21 cm. long, diverging at a wide angle from the much longer sterile lamina, the panicle pilose, a little shorter than the stalk, stout, with strong close branches, the lower ones apart; spores striate, not echinulate.

Type collected at Rio Permejo, Department of Santa Barbara, Honduras, altitude about 1800 meters, December, 1888, *C. Thieme*, distributed by Capt. John Donnell Smith under no. 5664 (U. S. Nat. Herb. no. 830288).

DISTRIBUTION: Known only from the type collection.

9. *Anemia hirsuta* (L.) Sw. Syn. Fil. 156. 1806.

Osmunda hirsuta L. Sp. Pl. 1064. 1753.

Rhizome horizontal, short-creeping; fronds several, clustered, the stipe of the fertile fronds usually surpassing the sterile fronds. Fertile fronds (including the elongate fertile pinnae), 15–43 cm. long; stipe 5–27 cm. long, usually slender, stramineous or sometimes castaneous or darker (especially at the base), hirsute, glabrescent; sterile lamina oblong-lanceolate to ovate-oblong, or sometimes deltoid-ovate, 3–15 cm. long, 2–6 cm. broad, gradually narrowed toward the apex, pinnate; pinnae 6–14 pairs, remote or contiguous, spreading, acutish, the lower and middle ones truncate at the base above, cuneate and often widely excised below, subsessile, oblong to ovate-oblong, deeply and obliquely cleft into several subequal distant linear or narrowly cuneate segments, these irregularly toothed, the basal one sometimes broader; upper pinnae cuneate both above and below, narrow, scarcely incised, the uppermost confluent, forming a narrow cuneate terminal segment; leaf-tissue firmly herbaceous, lustrous above, paler below, pilose above, more laxly so and sparingly glandular below, striate in drying, the veins conspicuously elevated above; fertile pinnae 7–23 cm. long, the stalk usually far surpassing the sterile lamina, the panicle usually close; spores cristate-striate, the ridges minutely echinulate or scabrous. Sterile fronds 7–25 cm. long; stipe 2–14 cm. long; lamina similar to that of the fertile frond or often relatively narrower, sometimes a little larger.

TYPE LOCALITY: Jamaica.

DISTRIBUTION: Jamaica, Santo Domingo, and Porto Rico, and on the continent from Mexico and Central America southward to Brazil.

ILLUSTRATIONS: Plumier, *Traité Foug.* pl. 162; Ark. Bot. 1: pl. 12, f. 3.

10. *Anemia pastinacaria* Moritz; Prantl, Schiz. 110. 1881.

Anemia pilosa longistipes Liebm. Vidensk. Selsk. Skr. V. 1: 301. 1849.

Anemia longistipes C. Chr. Index Fil. 53. 1905.

Rhizome horizontal; fronds several, the stipe of the fertile fronds surpassing the sterile fronds, often greatly so. Fertile fronds (including the greatly elongate fertile pinnae) 18–48 cm. long; stipe 7–25 cm. long, slender, stramineous or darker at the base, glabrescent; sterile lamina ovate-deltoid, sometimes narrowly so, 4–8.5 cm. long, 2.5–5.5 cm. broad, pinnate, acutish to acuminate, the rachis slender, glabrescent; pinnae 6–10 pairs, approximate or nearly their width apart, the lower ones spreading, the others ascending, all but the uppermost subsessile; lower and middle pinnae strongly inaequilateral at the base, long-cuneate below, above obtusely truncate, obliquely oblong, the apex obtuse or acutish, the margins thickened, irregularly denticulate-crenulate, commonly with a few very shallow oblique incisions, especially upon the upper margin; upper pinnae gradually smaller, narrower, semiadnate, abruptly confluent at the apex; leaf-tissue rigidly membranous to herbaceous-coriaceous, opaque, dull-greenish above, lighter below, sparingly pilose above, glabrescent below; veins elevated above, nearly concealed below; fertile pinnae 10–23 cm. long, $1\frac{1}{2}$ – $2\frac{1}{2}$ times as long as the sterile lamina, the stalks a little longer than the closely branched panicle; spores striate, the ridges with numerous slender columnar processes. Sterile fronds 8–23 cm. long, the stipe as long as the lamina; lamina 4–11.5 cm. long, 3–5 cm. broad, ovate-oblong or rarely deltoid-ovate, otherwise resembling the sterile lamina of the fertile fronds.

TYPE LOCALITY: Rocky situations, valley of the Rio Tigre, Colombia.

DISTRIBUTION: Southern Mexico and Central America; Cuba (rare); also in northern South America.

ILLUSTRATION: Hook. Gen. Fil. pl. 90 (as *A. mandioccana*), erroneously ascribed by writers to *A. hirta*.

11. *Anemia jaliscana* Maxon, sp. nov.

Rhizome horizontal; fronds several, clustered, the stipe of the fertile fronds usually surpassing the sterile fronds. Fertile fronds (including the elongate fertile pinnae) 15–32 cm. long; stipe 9–20 cm. long, slender, stramineous, glabrate or with a few long rusty hairs; lamina broadly deltoid-oblong, 4–10 cm. long, 2.5–6 cm. broad, pinnate, tapering gradually from the base, the apex obtuse, the rachis slender, greenish-stramineous; pinnae 5–7 pairs, contiguous, spreading, sessile, variable, obliquely and broadly oblong to rhombic-ovate, strongly inaequilateral at the base, long-cuneate, lightly and irregularly toothed to deeply lobed, or the lowermost exciso-cuneate at the base below, obtusely truncate above, sometimes pinnatifid at the base, the apex obtuse; upper pinnae gradually narrower, cuneate, the uppermost sometimes greatly reduced and subconfluent, forming a deeply lobed terminal segment, or scarcely reduced, the terminal segment nearly conform, obovate, cuneate; leaf-tissue membranous, dull-greenish and conspicuously short-hispid above, below much paler, minutely glandular, and with a few scattered hairs; veins elevated above, immersed below; margins thickened, irregularly dentate-crenulate; fertile pinnae 8–14 cm. long, surpassing the sterile lamina, the stalk 2–4 times as long as the usually dense panicle; spores sharply cristate, the ridges scabrous. Sterile fronds about one half as long as the fertile; stipe and lamina about equal, otherwise similar to those of the fertile frond.

Type collected on cool grassy bluffs of barranca near Guadalajara, State of Jalisco, Mexico, September 15, 1891, *Pringle 3850* (U. S. Nat. Herb. no. 50583).

DISTRIBUTION: Known only from the State of Jalisco, Mexico; apparently common.

12. *Anemia Brandegei* Davenp. Fern Bull. 13: 20. 1905.

Rhizome very short, ascending, closely covered with long few-celled fulvous hairs; fronds several, fasciculate, ascending or spreading (not rosulate), the stipes of the fertile fronds mostly not equaling the sterile fronds. Fertile fronds 2.5–5 cm. long; stipes deli-

cate, 1–2.5 cm. long, straight or arcuate, delicately long-pilose; lamina (including the spreading fertile basal pinnae) ovate or deltoid-ovate, 1.5–2.5 cm. long, 1–1.8 cm. broad, obtuse, the upper half obliquely pinnatifid, the lower half pinnate; primary segments and pinnae 3 or 4 pairs below the obliquely crenate-lobate apex, the basal (fertile) pinnae mostly a little shorter than the next, 5–10 mm. long, subbipinnate at the base, flattish, inequilateral, rhombic-ovate to narrowly deltoid, the divisions narrowly foliaceous-marginate, densely glandular-pilose; spores striate, smooth, the angles slightly produced; sterile pinnae and segments approximate or contiguous, the lowermost sessile, pinnatifid at the base, obliquely lobed or merely crenate, the lobes or crenations only 1 or 2 pairs, obtuse or rounded; leaf-tissue delicately herbaceous, glandular and conspicuously whitish-pilose upon both surfaces, glabrescent with age, then somewhat lustrous above. Sterile fronds similar but not exceeding 3 cm. in length; lamina deltoid, up to 1.5 cm. long, similar to the sterile portion of the fertile fronds.

TYPE LOCALITY: Cerro Colorado, vicinity of Culiacan, Sinaloa, Mexico, in shallow soil on the face of perpendicular cliffs.

DISTRIBUTION: Known only from the original specimens (*Brandege*).

ILLUSTRATION: Davenp. *loc. cit. pl.*

13. *Anemia aspera* (Fée) Baker, Jour. Linn. Soc. 14: 27. 1873.

Aneimiaebotrys aspera Fée, Crypt. Vasc. Brés. 1: 267. 1869.

Rhizome creeping; stipes of the fertile fronds not equaling the sterile fronds. Fertile fronds long-stipitate, the stipe about as long as the lamina, brownish-stramineous, stoutish, sulcate along the ventral face, glabrescent, at the base somewhat rough from the persistent bases of the stiff yellowish-brown hairs; lamina (including the spreading fertile basal pinnae) deltoid to deltoid-ovate, up to 35 cm. long and 26 cm. broad, tripinnate; pinnae 14–16 pairs, the fertile (basal) ones deltoid, 12–15 cm. long, up to 11.5 cm. broad at the base, with about 11 pairs of flat spreading deltoid-oblong pinnules, the lowermost basal ones of these about 6 cm. long and 2.2 cm. broad at the base, stalked (9 mm.), with about 9 pairs of flat deltoid-oblong mostly short-stalked segments, these bipinnatifid, minutely pilose; spores broadly striate, scabro-verruculose, the angles produced; sterile pinnae spreading, contiguous, petiolate from a cordate base, unequally ovate-deltoid, acuminate, the larger ones with 10 or 11 pairs of pinnules, basisopic, the inferior basal pinnules petiolate, deltoid-lanceolate from a cordate base, about 5 cm. long and 2.5 cm. broad at the base, with about 7 pairs of ovate to ovate-oblong acute segments, the basal ones trilobate, the margins a little thickened, obscurely denticulate-sinuate; upper pinnae narrower, oblong-lanceolate, finally adnate and confluent at the acuminate apex; leaf-tissue herbaceous, dull dark-greenish above, a little paler below, minutely and scantily glandular upon both surfaces, glabrous above, nearly so below; veins elevated on both surfaces, slender. Sterile fronds similar but smaller, the pinnae (from description) narrower, ovate-lanceolate; pinnules of the lower pinnae (or at least of the lowermost) anadromous, of the upper ones catadromous.

TYPE LOCALITY: Serra dos Orgaos au Morro Queimado, Chemin dos Macacos, Brazil.

DISTRIBUTION: Costa Rica or Veragua, Panama; also in Brazil.

ILLUSTRATION: Fée, *loc. cit. pl. 78, f. 2.*

14. *Anemia anthriscifolia* Schrad. Gött. Gel. Anz.

1824: 865. 1824.

Rhizomes slender or stoutish, horizontally creeping, sometimes rather widely so; fronds usually several, close, the stipe of the fertile fronds scarcely exceeding the sterile fronds. Fertile fronds 15–57 cm. long; stipes 5–40 cm. long, stoutish, dull- or yellowish-stramineous from a darker base, straight or subflexuous, deciduously pilose; sterile lamina ovate-deltoid, 5–15 cm. long and broad, acute, bipinnate, nearly tripinnate at the base, the rachis similar to the stipe, the secondary rachises densely clothed with long subpersistent ferruginous hairs; pinnae 6–11 pairs, mostly contiguous or overlapping, rarely apart, spreading, the lower and middle ones petiolate, ovate to oblong-lanceolate from a subcordate base, subacute, the lowermost with 6–10 pairs of distant pinnules, the basal of these

petiolate, obliquely pinnatifid close to the costa into about 5-7 pairs of acute serrate or pinnately incised segments; succeeding pinnules sessile to narrowly or broadly adnate, finally confluent, lanceolate, acute, all sharply and obliquely pinnatisect; upper pinnae gradually simpler, sessile, only the uppermost adnate, the divisions all oblique; leaf-tissue herbaceous, bright lustrous green above, paler below, pilose and glandular upon both surfaces, conspicuously so below; margins thickened, usually revolute or recurved; veins evident upon both surfaces; fertile pinnae stout, rigidly erect, 8-20 cm. long, surpassing the sterile lamina, often greatly so, short-stalked, the branches elongate; spores striate, smooth or minutely echinulate, the angles not produced. Sterile fronds 10-30 cm. long; lamina usually as long as the stipe, ovate or ovate-deltoid, or subpentagonal by the basisopic development of the basal pinnae; pinnules mostly anadromous, only those of the upper pinnae catadromous.

TYPE LOCALITY: Brazil.

DISTRIBUTION: Widely distributed in Mexico; also in Brazil, Paraguay, and Peru.

ILLUSTRATIONS: Ettingsh. Farnkr. *pl.* 172, *f.* 6; *pl.* 173, *f.* 2 (as *A. fulva*).

15. *Anemia guatemalensis* Maxon, sp. nov.

Rhizome wanting; stipes of the fertile fronds mostly longer than the detached sterile fronds. Fertile fronds 30-45 cm. long; stipe stout, 23-30 cm. long, erect, yellowish, very densely clothed with subpersistent spreading dark-rusty hairs; sterile lamina deltoid, 12-16 cm. long, 10-12 cm. broad, acute, tripinnate below, deeply tripinnatifid nearly throughout, the rachis conspicuously ferruginous-pilose; pinnae about 10 pairs, spreading or ascending, contiguous or imbricate, short-petiolate, mostly ovate-lanceolate or the lowermost narrowly deltoid-ovate, these the largest, 6.5-7.5 cm. long, 2.5-3 cm. broad near the base, with 8 or 9 pairs of oblong-lanceolate pinnules below the short subacute crenately lobed apex, the larger of these pinnate at the base, above deeply pinnatifid with about 4 pairs of segments, the basal ones crenately lobed; upper pinnae gradually simpler, the pinnules short-stalked or sessile, only those of the uppermost pinnae finally adnate; leaf-tissue rigidly chartaceo-membranous, thickish but translucent, dull-green above, lighter or yellowish-green below, obscurely glandular above, conspicuously so below, the upper surface glabrate, the lower conspicuously rusty-pilose along the secondary rachis, costae and veins; veins concealed or somewhat impressed above, scarcely evident below; margins slightly thickened; fertile pinnae stout, erect, 13-15 cm. long, nearly or quite as long as the sterile lamina, the stalk very short (2-2.5 cm. long), the panicle with numerous strict erect branches, the lowermost of these up to 4.5 cm. long with short pinnate divisions, the upper branches gradually shorter and closer, the uppermost densely crowded; spores striate, the angles not produced. Sterile fronds 16-33 cm. long; stipe 8-9 cm. long; lamina 10-18 cm. long, 9-15 cm. broad, ovate-deltoid or subpentagonal, the basal pinnae strongly basisopic, spreading, unequally deltoid, the inferior basal pinnules oblong-ovate, in the largest specimen 3.8 cm. long and 1.9 cm. broad, with about 5 pairs of ovate-oblong pinnatifid or lobed segments below the trilobate apex, the lowermost sessile; pinnules mostly anadromous, only those of the upper third of the lamina catadromous.

Type collected at Cerro Gordo, Department of Santa Rosa, Guatemala, altitude about 1050 meters, August, 1892, *Heyde & Lux*, distributed by Captain John Donnell Smith under no. 4095 (U. S. Nat. Herb. no. 830301).

DISTRIBUTION: Known only from Guatemala.

16. *Anemia Rosei* Maxon, sp. nov.

Rhizomes decumbent, stoutish, closely clustered; fronds fasciculate, the stipes of the fertile fronds usually equaling or surpassing the sterile fronds. Fertile fronds 36-42 cm. long, weakly ascending; stipes rather slender, 19-26 cm. long, light-stramineous, arcuate or subflexuous, sparingly clothed with delicate very slender spreading fulvous hairs, these readily deciduous; sterile lamina deltoid-ovate, 14-16 cm. long, 9-12 cm. broad, acuminate, bipinnate or, as to the basal pinnae, nearly tripinnate, the rachis similar to the stipe, long-pilose; pinnae about 10-13 pairs, contiguous or the lower ones apart, these and the middle ones petiolate from a cordate base, broadly oblong-lanceolate, obtusish, slightly oblique, with 6-8 pairs of sessile or semiadnate deltoid-ovate, ovate or ovate-oblong oblique obtuse

segments, the larger of these deeply and obliquely pinnatifid half way or nearly to the mid-vein into 2 or 3 pairs of broad unequally rounded lobes; upper pinnae gradually smaller and simpler, finally adnate, confluent at the crenate apex; leaf-tissue membrano-coriaceous, light-green, lighter below, glandular upon both surfaces, inconspicuously fibrillose-hirsute, mainly along the veins of the lower surface; margins slightly thickened, a little recurved; veins slightly elevated upon both surfaces; fertile pinnae ascending or somewhat divergent, stout, 6-11 cm. long, about one half the length of the sterile lamina, the stalk 3-3.5 cm. long, the panicle stoutish, with mostly short close divisions, the lower ones somewhat apart; spores immature. Sterile fronds 23-38 cm. long; stipe 10-21 cm. long; lamina 13-18 cm. long, 9-12 cm. broad, ovate, deltoid or subpentagonal by the basisopic development of the lowermost pinnae, these ascending, unequally elongate-deltoid, with the inferior basal pinnules deltoid-oblong, 2-3.3 cm. long, 8-11 mm. broad; pinnules of the basal pinnae anadromous, of the other pinnae catadromous.

Type collected in shade of rocks, Sierra de San Esteban, State of Jalisco, Mexico, altitude about 1500 meters, December 6, 1902, *Pringle 11254* (U. S. Nat. Herb. no. 460628).

DISTRIBUTION: Known only from the State of Jalisco, Mexico.

17. *Anemia Karwinskyana* (Presl) Prantl, Schiz. 99. 1881.

Anemia villosa Karwinskyana Presl, Abh. Böhm. Ges. Wiss. V. 4: 343. 1845.

Rhizome stout, decumbent or ascending; fronds closely fasciculate, the stipes of the fertile fronds barely surpassing the sterile fronds. Fertile fronds 32-38 cm. long; stipe 19-28 cm. long, erect, stout, flattish, light brownish-stramineous, clothed rather thickly with long subsistent irregularly spreading brown hairs; sterile lamina deltoid, 10-11 cm. long, about 9 cm. broad, acutish, bipinnate, the rachis similar to the stipe; pinnae about 9 pairs, contiguous, the lowermost and middle ones short-petiolate from a cordate base, ovate-oblong, obtusish, with about 5 or 6 pairs of mostly semiadnate rhombic-orbicular to oblong-ovate segments, these contiguous or half their width apart, obtusish, mostly 3-lobed, the larger ones crenately pinnatifid into 5-7 lobes; upper pinnae gradually shorter and simpler, the uppermost adnate, confluent; leaf-tissue subcoriaceous, dull-greenish, scarcely lighter below, noticeably glandular upon both surfaces, laxly fibrillose-hirsute, conspicuously so over the whole lower surface; margins thickened, slightly revolute; veins elevated above, subimmersed below; fertile pinnae strict, erect, 12-14 cm. long, exceeding the sterile lamina, the stalk 2-3.5 cm. long, the panicle with numerous strict ascending divisions, the lowermost of these 2.5-3.5 cm. long; spores broadly striate, the angles not produced. Sterile fronds 24-27 cm. long; stipe 12-13 cm. long; lamina ovate-deltoid, 14-15.5 cm. long, 10-11.5 cm. broad; pinnae 9-11 pairs, approximate or the lowermost apart, these unequally deltoid-ovate, strongly basisopic, the inferior basal pinnule about 2.3 cm. long with about 9 blunt triangular-ovate lobes, the superior basal pinnule trilobate; middle and upper pinnae as on the fertile frond; pinnules of the basal pinnae anadromous, of the other pinnae catadromous.

TYPE LOCALITY: Cristo, Mexico.

DISTRIBUTION: Known only from Mexico.

18. *Anemia Wrightii* Baker, in Hook. & Baker, Syn. Fil. 435. 1868.

Ornithopteris Wrightii Millsp. Field Col. Mus. Bot. 3: 14 (excl. description). 1903.

Rhizome short-creeping, densely clothed with minute brownish hairs; fronds dimorphous, obscurely distichous, closely fasciculate, the stipe of the fertile fronds far exceeding the sterile fronds. Sterile fronds 5-11 cm. long, laxly ascending; stipes slender, stramineous from a darker base, 3-7 cm. long; lamina narrowly ovate or somewhat deltoid, 3-6 cm. long, 2-3 cm. broad, bipinnate at the base; pinnae 3 or 4 pairs, remote, decreasing gradually toward the apex of the lamina, the upper ones narrowly cuneate, strongly ascending and confluent at the acutish apex, the middle and lower ones short-petiolate and slightly ascending; basal pinnae ovate from an unequally cuneate base, with 1 or 2 pairs of subsessile narrowly obovate long-cuneate segments, these inciso-dentate at the apex; veins elevated on both surfaces; leaf-tissue firmly membranous, opaque upon both surfaces, paler and sparsely glandular below, very sparingly pilose both above and below between the

veins. Fertile fronds 15-25 cm. long, the lamina one-third to one-sixth as long as the slender subflexuous stramineous stipe; pinnae alternate, remote, petiolate, the lowermost 5-15 mm. long; pinnules short and close, with few pilose segments; spores reticulate-striate.

TYPE LOCALITY: Eastern Cuba.

DISTRIBUTION: Confined to Cuba. The Yucatan plant referred to this species is *A. cicutaria*.

19. *Anemia cicutaria* Kunze; Spreng. Syst. Veg. 4: 31. 1827;
Linnaea 9: 22. 1834.

Mohria intermedia J. Smith, Lond. Jour. Bot. 2: 387. 1843.

Coplophyllum cicutarium Klotzsch, Linnaea 18: 527. 1844.

Ornithopteris cicutaria Underw. Mem. Torrey Club 12: 15. 1902.

Anemia bipinnata Moore, Index Fil. cxvi. 1857. Not *A. bipinnata* Sw. 1806.

Rhizome short-creeping, densely clothed with short dark-brown hairs; fronds dimorphous, dorsal, obscurely distichous, closely fasciculate, the stipes of the fertile ones easily surpassing the sterile fronds. Sterile fronds 6-15 cm. long, ascending or spreading; stipes filiform, 6-8.5 cm. long, flexuous or arcuate, stramineous; lamina deltoid to deltoid-ovate, 3-8.5 cm. long, 2.5-7 cm. broad, bipinnate, or, as to the lower pinnae, deeply tripinnatifid; pinnae 3-7 pairs, alternate, contiguous or mostly apart, ascending (or the lowermost spreading), the middle and lower ones petiolate, subequilateral, deltoid to deltoid-ovate, obtuse, those above rhombic-ovate to oblong, finally confluent at the short obtuse apex; pinnules of the basal pinnae 2-5 pairs, short-stalked or sessile, rhombic-ovate to rhombic-oblong, unequally cuneate, the larger ones deeply pinnatifid into 1-3 (4) pairs of oblique cuneate segments, these inciso-dentate at the obtuse apex; pinnules and segments anadromous; veins slightly elevated upon both surfaces; leaf-tissue firmly membranous, opaque, slightly paler below, sparsely pilose upon both surfaces, copiously glandular below, sparingly so above. Fertile fronds 5-14 cm. long, the panicle one-third to nearly one-half as long as the slender stramineous or brownish-stramineous stipe; pinnae distant, alternate, the lowermost up to 5 cm. long, long-stalked, the pinnules short, sessile, with marginate segments; spores reticulate-striate.

TYPE LOCALITY: In crevices of rocks, along shaded river near the Embarcadero del Canimar, Cuba.

DISTRIBUTION: Cuba; islands of Abaco, Andros, and New Providence, Bahamas; Yucatan.

ILLUSTRATIONS: Kunze, Anal. Pterid. pl. 5, f. 2; Field Columb. Mus. Publ. Bot. 3: 13. f.; 14. f. (the last as *Ornithopteris Wrightii*).

20. *Anemia portoricensis* Maxon, sp. nov.

Rhizome creeping, densely covered with dark-brown or blackish turgid acicular hairs; fronds dimorphous, dorsal, distichous, clustered, the fertile ones equaling or surpassing the sterile. Sterile fronds recurved or ascending, 8-21 cm. long; stipes flexuous, 6-12 cm. long, slender or stoutish, clothed with stiff ascending or appressed brownish acicular hairs; lamina oblong-deltoid, oblong or deltoid-oblong, obtuse, 7-12 cm. long, 3-6 cm. broad in the lower part, bipinnate at the base, bipinnatifid above; pinnae spreading, approximate to imbricate, mostly short-stalked, only the upper ones subsessile, the lowermost unequally rounded-deltoid to deltoid-oblong, with 1 or rarely 2 pairs of mainly suborbicular short-stalked or sessile segments below the obtuse cuneate-lobate terminal segment; middle pinnae similar, often only deeply lobed, or with a free basal segment at the upper side, rounded exciso-cuneate at the lower; upper pinnae rhombic-ovate, cuneate at the base below, the uppermost suborbicular to obovate, finally subconfluent and commonly forming an unequal cuneate lightly lobate terminal segment; veins elevated below, immersed but apparent above; margins greatly thickened, cartilaginous, subentire or lightly sinuate-dentate, slightly revolute, the pinnules by contraction often strongly concave; leaf-tissue rigidly coriaceous, lustrous and minutely glandular upon both surfaces, sparsely long-pilose below with curved antrorse yellowish-white subpersistent hairs. Fertile fronds slender but erect, subflexuous, 10-22 cm. long; stipe slender, light-brown; lamina linear-oblong, usually about one-third or one-half as long as the stipe; pinnae subopposite or alternate, all but the uppermost distant, short-stalked, the lowermost up to 1.5 cm. long; pinnules conspicuously glandular-pilose, subflabellate; spores broadly striate, the ridges subflexuous and uneven.

Type collected on limestone cliffs, on the road from Utuado to Arecibo, Porto Rico, July 13, 1901, *Underwood & Griggs 802* (U. S. Nat. Herb. no. 405735).

DISTRIBUTION: Confined to Porto Rico; upon limestone cliffs and partially shaded or open rocky slopes.

21. *Anemia aurita* Sw. Syn. Fil. 157. 1806.

Osmunda aurita Sw. Prodr. 127. 1788.

Mohria aurita J. Smith, Lond. Jour. Bot. 2: 388. 1843.

Rhizome creeping, densely clothed with turgid acicular blackish hairs; fronds dimorphous, dorsal, distichous, the fertile ones equaling or often surpassing the sterile. Sterile fronds ascending or arching, 15–35 cm. long; stipe arcuate or flexuous, 8–15 or rarely 19 cm. long, light- or dark-brown, stoutish, clothed at the base like the rhizome, above with spreading or antrorse yellowish or brownish filiform hairs; lamina narrowly deltoid to oblong-deltoid, rarely oblong, 10–17 cm. long, 5–11 cm. broad at the base, bipinnate below, simply pinnate toward the apex, the uppermost segments more or less confluent at the obtuse or subacute apex; pinnae spreading, approximate, the lower and middle ones distinctly stalked, ovate-deltoid to rhombic-ovate, truncate at the upper base and close to the rachis, cuneate below; lowermost pinnae fully pinnate at the base, with 1–4 pairs of ovate, orbicular, or obovate segments below the obtuse lobate apex, the basal ones stalked and rarely rhombic-ovate to deltoid; middle pinnae gradually simpler, the uppermost rhombic-oblong to rhombic-ovate, exciso-cuneate at the base below; veins elevated below, subimmersed but evident above; margins strongly and sharply inciso-denticulate, thickened, flattish or slightly revolute; leaf-tissue rigidly coriaceous, bright lustrous green and very minutely glandular upon both surfaces, glabrate below. Fertile fronds 25–45 cm. long; stipe stoutish, strict or a little flexuous above; fertile lamina one-third or one-half as long as the stipe; pinnae alternate, spaced, ascending, the lower ones up to 6 cm. long, long-stalked, those above gradually shorter; pinnules pilose, glandular, spaced, the segments subflabellate; spores broadly striate, the ridges subflexuous and undulate.

TYPE LOCALITY: Jamaica.

DISTRIBUTION: Confined to Jamaica, mainly in the central and western parts of the island, on rocky partially shaded slopes, at 600 meters elevation or less.

ILLUSTRATION: Hook. Ic. Pl. *pl.* 903.

22. *Anemia mexicana* Klotzsch, Linnaea 18: 526. 1844.

Ornithopteris mexicana Underw. Our Nat. Ferns ed. 6. 76. 1900.

Rhizome creeping, thickly clothed with acicular turgid blackish or dark-brown hairs; fronds several, dorsal, distichous, close, the stipes of the fertile fronds not equaling the sterile fronds. Fertile fronds 25–50 cm. long; stipe 13–28 cm. long, slender or usually stoutish, dull-stramineous from a darker base, canaliculate along the ventral face, often angled in drying, at first dark-fibrillose near the base, glabrate above; sterile lamina deltoid-ovate, usually very broadly so, 7–23 cm. long, 7–20 cm. broad, acute, once-pinnate, the rachis stramineous, canaliculate along the ventral face, glabrate or with a few blackish acicular hairs at the side; pinnae 3–7 pairs, contiguous or half their width apart, spreading, the lowermost the largest, petiolate, lanceolate-oblong to ovate-lanceolate, acute or attenuate, subcordate-truncate at the base, or the lower side exciso-cuneate; middle pinnae similar, gradually smaller, subequilateral at the base, the upper ones free, sessile, or the uppermost on either side confluent with the terminal segment, this usually larger than the pinna below, inequilateral, cuneate, subcordate or sometimes unequally hastate; leaf-tissue rigidly membrano-chartaceous, dull-green and glabrous above, paler and minutely glandular below; costae nearly medial, conspicuously elevated, stramineous; veins very oblique, repeatedly dichotomous, very close, distinctly elevated upon both surfaces, fibrillose-hirtous below or often nearly glabrous; margins thickened, sharply and unevenly serrulate-denticulate; fertile pinnae 9–30 cm. long, invariably surpassing the sterile lamina, often greatly so, the panicle as long as the stalk or longer, flattish or the divisions somewhat involute, short, the lower and middle ones petiolate, remote, the upper ones simpler, shorter, densely crowded; spores closely cristate-striate, the ridges somewhat flexuous. Sterile fronds shorter, 13–45 cm. long, the stipe and lamina about equal; lamina 13–25 cm. long, 11–18 cm. broad, deltoid-ovate to oblong-ovate, otherwise as in the fertile frond; pinnae 4–7 pairs.

TYPE LOCALITY : Mexico.

DISTRIBUTION : Western Texas, southward to the states of Tamaulipas, Coahuila, Nuevo Leon and Morelos, Mexico.

ILLUSTRATIONS : Hook. Ic. Pl. *pl.* 988; Kunze, Farrnkr. 2 : *pl.* 131.

23. *Anemia speciosa* Presl, Abh. Böhm. Ges. Wiss. V. 4 : 349. 1845.

Anemia mexicana paucifolia Hook. Second Cent. Ferns *pl.* 65. 1861.

Rhizome creeping, thickly clothed with long turgid mainly light- or yellowish-brown hairs; fronds several, dorsal, distichous, loosely fasciculate, the stipes of the fertile fronds not equaling the sterile fronds. Fertile fronds 10–50 cm. long, rigidly erect; stipe up to 30 cm. long, usually longer than the sterile lamina, mostly stoutish, dull-stramineous or light-brownish from a darker base, nearly terete or lightly canaliculate above, at first noticeably dark-fibrillose especially toward the base, glabrescent; sterile lamina broadly deltoid-ovate, up to 18 cm. long and 15 cm. broad, long-acuminate, once-pinnate, the rachis similar to the stipe, sulcate, deciduously fibrillose; pinnae 1–4 pairs, approximate or the lower ones slightly apart, spreading or somewhat ascending, equilateral or nearly so, petiolate, the 2 lower pairs about equal, oblong-lanceolate from an obtusely cuneate or rounded-truncate base, in large specimens 6.5–9.5 cm. long and 2–2.5 cm. broad, tapering gradually from near the middle to a long acute apex; upper pinnae smaller and relatively broader, narrowly ovate-lanceolate, the terminal pinna similar but usually much larger (maximum 9–11.5 cm. long), deltoid-lanceolate, the apex greatly produced; leaf-tissue rigidly coriaceous, thick, bright lustrous green above, paler and very sparingly glandular below, glabrous upon both surfaces; veins oblique, repeatedly dichotomous, somewhat apart except toward the margin, distinctly impressed upon the upper surface, elevated below, glabrous; margins cartilaginous, usually serrulate, the teeth stoutish, appressed or commonly hamate; fertile pinnae up to 15 cm. long, usually much shorter, never equaling the sterile lamina, borne 1.5–3 cm. below, ascending, the panicle about twice as long as the slender stalk, flattish, lanceolate in outline, the divisions mostly close, oblique, the lower and middle ones distinctly stalked; spores widely and sharply striate. Sterile fronds considerably smaller, otherwise similar.

TYPE LOCALITY : Western Mexico.

DISTRIBUTION : Southern and western Mexico to the Departments of Petén and Alta Verapaz, Guatemala; Cuba (rare).

ILLUSTRATION : Hook. *loc. cit.* (small specimens).

24. *Anemia cuneata* Kunze; Spreng. Syst. Veg. 4 : 32. 1827;

Linnaea 9 : 21. 1834.

Rhizome rather freely creeping, densely clothed with turgid acicular dark-brown hairs; fronds several, dorsal, manifestly distichous, spaced, the stipes of the fertile fronds not equaling the sterile fronds. Sterile fronds 8–31 cm. long, rigidly ascending; stipes slender, up to 12 cm. long, shorter than the lamina, stramineous from a castaneous base, glabrous; lamina up to 19 cm. long, usually much smaller, narrowly ovate-lanceolate in outline, attenuate, bipinnate or, as to the lower pinnae, tripinnate; pinnae 4–8 pairs, alternate, distant, strongly ascending, decreasing gradually from the base of the lamina toward the apex; lower and middle pinnae petiolate, lanceolate in outline, acute or attenuate, with 3–5 pairs of very oblique alternate narrow pinnules, of these the upper basal one largest, pinnate at the base and comprising 3–5 alternate slender long-cuneate narrowly oblanceolate or nearly linear segments, these strongly fimbriate or inciso-dentate at the apex; upper pinnae gradually simpler, at least bipinnate, only the uppermost simple, finally confluent at the slender serrate apex; pinnules and segments anadromous; veins evident above, scarcely so below; leaf-tissue rigidly herbaceous, slightly lustrous, paler and glandular below, and with a very few scattering stiff hairs between the veins upon both surfaces. Fertile fronds more rigidly erect, up to 30 cm. long; stipe as long as the lamina or commonly twice as long; sterile lamina similar to that of the sterile frond; fertile (basal) pinnae remote, long-petiolate, elongate but not equaling the sterile lamina, the divisions short and remote, the lower ones stalked, with several pairs of close simple or forked segments; spores flexuose-striate, the ridges slightly undulate.

TYPE LOCALITY: Shaded rocky banks of streams, near Santa Ana-Cavalleros, Cuba.

DISTRIBUTION: Known only from Cuba.

ILLUSTRATIONS: Kunze, Anal. Pterid. *pl.* 8, *f.* 1; E. & P. Nat. Pfl. 14: 370. *f.* 198, *C.*

25. *Anemia coriacea* Griseb. Cat. Pl. Cuba 272. 1866.

Rhizome relatively slender and wide-creeping, freely branched, densely clothed with slender brown turgid hairs; fronds dorsal, manifestly distichous, spaced or subfasciculate, the stipes of the fertile fronds mostly surpassing the sterile fronds, usually much so. Sterile fronds 5–9 cm. long, rigidly ascending; stipes stoutish, 2.5–5 cm. long, dark-brown, smooth, or at the arcuate base pilose; lamina deltoid or ovate-deltoid, 2.5–5 cm. long, 2–4 cm. broad, acute, bipinnatifid or sometimes bipinnate at the base; pinnae 4–6 pairs, approximate, slightly ascending, alternate, the lowermost petiolate, hastate, obtusely cuneate at the base below, truncate above, and broadly subauriculate both above and below, or in larger fronds elongate, lanceolate-deltoid, with a single pair of ovate or suborbicular pinnules at the base and crenately lobed below the obtuse apex; middle pinnae short-petiolate to sessile, unequally hastate to deltoid-oblong, the uppermost ovate-oblong, semiadnate, finally confluent at the acute subentire apex; veins prominent upon both surfaces; leaf-tissue very coriaceous, lustrous upon both surfaces, paler below, glandular and very sparsely pilose upon both surfaces; margins denticulate, thickened, rigidly recurved, the segments often concave. Fertile fronds 14–24 cm. long, erect; stipes elongate, 8–15 cm. long; sterile lamina similar to that of the sterile frond but narrower and smaller; fertile (basal) pinnae alternate, long-petiolate, 6–9.5 cm. long, 2 to 3 times as long as the sterile lamina, the pinnules alternate, remote, bipinnatifid, with distinct and nearly glabrous segments; spores cristate-striate, the ridges undulate.

TYPE LOCALITY: Cuba.

DISTRIBUTION: Known only from eastern Cuba.

26. *Anemia adiantifolia* (L.) Sw. Syn. Fil. 157. 1806.

Osmunda adiantifolia L. Sp. Pl. 1065. 1753.

Osmunda asplenifolia Savigny, in Lam. Encyc. 4: 652. 1797.

Ornithopteris adiantifolia Bernh. Neues Jour. Bot. Schrad. 12: 50. 1806.

Anemia asplenifolia Sw. Syn. Fil. 157. 1806.

Anemia carvifolia Presl, Rel. Haenk. 1: 74. 1825.

Anemia adiantifolia asplenifolia Hook. & Grev. Ic. Fil. 1: *pl.* 16. 1829.

Rhizome creeping, closely clothed with dark-brown or blackish acicular turgid hairs; fronds dorsal, distichous, approximate, the stipe of the fertile ones usually not equaling the sterile fronds. Sterile fronds ascending or arching, 15–70 cm. long; stipe usually a little longer than the lamina, brownish-stramineous from a darker base or rarely castaneous throughout, clothed with dark to lightish flaccid hairs, glabrescent except near the base; lamina ovate-deltoid or subpentagonal, 7–35 cm. long, 4–28 cm. broad at the base, bi-tripinnate, or in large forms deeply quadripinnatifid at the base, gradually simpler above, the upper pinnae closer, sessile, very gradually reduced, the uppermost adnate, finally confluent at the elongate acuminate apex; pinnae numerous, contiguous or imbricate, slightly ascending, all but the upper ones distinctly stalked, in outline truncate above at the base and usually contiguous with the rachis, exciso-cuneate below, the pinnules wholly anadromous; lowermost pinnae the largest, deltoid-lanceolate, often elongate, inequilateral by the development of the inferior basal pinnules, these deltoid-lanceolate or ovate-lanceolate from a broad base, acute, fully pinnate (segments 1–6 pairs, the basal ones often deeply pinnatifid), the anterior pinnules approximate or contiguous, exciso-cuneate below, inequilateral, ovate-lanceolate to ovate-oblong or narrowly subrhombic, all but the outermost deeply pinnatifid or incised, these oblong-obovate (often narrowly so), obtuse, the ultimate segments of the lamina in general similar to these, wholly anadromous; rachises long-pubescent throughout with slender mostly whitish hairs; leaf-tissue usually coriaceous, lustrous upon both surfaces, paler and glandular below, pilose upon both surfaces, especially between the veins, finally glabrescent above; margins erose-denticulate, thickened. Fertile fronds mostly 15–85 cm. long, the lamina about one half to one fourth the length of the frond, similar to that of the sterile frond or usually not pentagonal; fertile (basal)

pinnae erect, remote, usually shorter than the sterile lamina, sometimes exceeding it a little; panicle usually as long as the stalk, sometimes 2-4 times as long, the divisions either laxly disposed or compact; spores cristate, the ridges flexuous and undulate.

TYPE LOCALITY: Near Petit Goâve, Haïti.

DISTRIBUTION: Peninsular Florida, the Bahamas, and the West Indies generally to Trinidad; less common in Mexico and Guatemala; known also from a single locality in Brazil and one in Colombia.

ILLUSTRATIONS: Plumier, *Traité Foug.* *pl.* 158; Bernh. *loc. cit.* *pl.* 3, *f.* 15a; Hook. & Grev. *loc. cit.*; Lowe, *Nat. Hist. New & Rare Ferns* *pl.* 32; Denks. Akad. Wiss. Wien 23: *pl.* 18, *f.* 9; Ettingsh. *Farnkr.* *pl.* 172, *f.* 11, *pl.* 173, *f.* 8; D. C. Eaton, *Ferns N. Am.* *pl.* 15.

DOUBTFUL OR EXTRALIMITAL SPECIES

Anemia cornea Prantl, *Schiz.* 104. 1881. Described from specimens collected near Trapiche de la Concepcion, Oaxaca, Mexico, altitude about 900 meters, *Liebmann*. Presumably a valid species, resembling *A. humilis* but distinct in spore characters. Only a small frond of the original collection has been seen by the writer. Known only from the type collection.

Anemia distans Fée, *Mém. Foug.* 9: 41 (33). 1857. Founded upon specimens from Talea, Mexico, *Galeotti 6567bis*. Unidentified; the description very incomplete.

Anemia elegans (Gardn.) Presl, *Abh. Böhm. Ges. Wiss.* V. 4: 341. 1845. (*Trochopteris elegans* Gardn. *Lond. Jour. Bot.* 1: 74. *pl.* 4. 1842.) Apparently confined to Brazil, the type being from the Serra de Natividade, province of Goyaz, *Gardner 4085*. By confusion of collectors' numbers erroneously ascribed to Cuba; see Prantl, *Schiz.* 90. 1881.

Anemia filiformis (Savigny) Sw. *Syn. Fil.* 156. 1806. (*Osmunda filiformis* Savigny, in *Lam. Encyc.* 4: 652. 1797. *Anemia repens minor* Raddi, *Pl. Bras.* 1: 71. *pl.* 9, *f.* 2a. 1825.) Type from South America, and only South American specimens are cited by Prantl. Cited from Jamaica by Jenman, probably in error, and from Mexico by Presl on the basis of specimens collected near Tlacolula by Ehrenberg. Not seen by the writer and not cited from North America by Prantl.

Anemia helveola Fée, *Mém. Foug.* 9: 41 (32). 1857. Founded upon specimens from Villa Alta, Oaxaca, Mexico, *Galeotti 6585bis*. Unidentified; the description meager.

Anemia laciniata Link, *Fil. Sp.* 25. 1841. Described from cultivated specimens; regarded by Prantl (*loc. cit.* 121) as a hybrid, *A. ciliata* × *Phyllitidis*. Further synonymy is given by Prantl, who cites specimens also from Venezuela and Mexico. Not known to the writer from specimens.

Anemia mandioccana Raddi, *Opusc. Sci. Bol.* 3: 282. 1819. A strictly Brazilian species, ascribed to Jamaica by Grisebach; on this account included by Jenman in his treatment of the Jamaican species, his description drawn from Brazilian specimens.

Anemia Munchii Christ, *Bull. Herb. Boiss.* II. 7: 792. 1907. Founded upon specimens from San Cristobal, Chiapas, Mexico, *Munch 30*. Not seen by the writer; from the description apparently a small abnormal form of *A. Phyllitidis*.

Anemia Presliana Prantl, *Schiz.* 104. 1881. Apparently confined to Brazil. The Guatemalan and Colombian plants so referred by Hieronymus (*Bot. Jahrb.* 34: 565. 1905) are *A. humilis*, as here understood.

Anemia repens Raddi, *Opusc. Sci. Bol.* 3: 282. 1819; Raddi, *Pl. Bras.* 1: 71. *pl.* 9, *f.* 2b (β major, not α). 1825. (*Anemia ciliata* Presl, *Del. Prag.* 1: 158. 1822.) Ascribed to Mexico, Honduras, Panama, and Santo Domingo by Prantl. Material within this range examined by the writer is referable to *A. hirsuta*, from which *A. repens* is perhaps not separable specifically. The type is from Brazil.

Family 4. GLEICHENIACEAE

BY WILLIAM RALPH MAXON

Mainly xerophilous plants of tropical and subtropical regions, mostly with branched and creeping rhizomes (erect in *Stromatopteris*), the fronds circinate in veneration, continuous with the rhizome, distant or subfasciculate, rarely simple, mostly consisting of an erect or ascending primary leaf-axis of indeterminate growth bearing one or several pairs of opposite primary lateral branches in acropetal succession, these simple and determinate or 1 to several times dichotomous, the included (apparently terminal) buds dormant or developing secondary or tertiary leaf-axes similar to the primary, the ultimate branches (pinnae) usually in pairs, bipinnate, pinnate or deeply pinnatifid, the segments or pinnules mostly elongate and pectinate (or, in *Gleichenia*, minute, rounded or oval, and moniliform); veins free, once or several times forked (or, in *Gleichenia*, simple). Sori borne upon the under surface of the segments, dorsal upon the veins (or, in *Gleichenia*, terminal), superficial, non-indusiate; sporangia sessile, subglobose to pyriform, usually 2-6, radial from a slightly elevated roundish (or, in *Stromatopteris*, hippocrepiform) receptacle, or in a few species numerous and borne in more than one rank; annulus obliquely transverse, nearly complete, the sporangium opening by a vertical fissure on the side facing the center of the sorus; spores diplanate or triplanate, smoothish or sculptured. Prothallia flattish, green.

1. DICRANOPTERIS Bernh. Neues Jour. Bot.

Schrader. 1²: 38. 1806.

Mertensia Willd. Sv. Vet.-Akad. Handl. II. 25: 163. 1804. Not *Mertensia* Roth, 1793.
Mesosorus Hassk. Obs. Bot. Fil. Bogor. 1: 2. 1856.

Characters of the family, excluding those assigned to the old-world genera *Gleichenia* and *Stromatopteris*.

Type species, *Polypodium dichotomum* Thunb. = *D. linearis* (Burm.) Underw.

- | | |
|---|------------------------------|
| Primary branches bipinnate, the rachis not forked. | 1. <i>D. Bancroftii</i> . |
| Primary branches mostly once or several times forked and wholly or partially pectinate, or rarely simple and pectinate. | |
| Internodes of primary branches naked normally. | |
| A pair of accessory pinnae borne at all but the ultimate nodes. | 2. <i>D. flexuosa</i> . |
| Accessory pinnae wanting. | |
| Primary branches bilaterally asymmetrical, a falsely sympodial secondary axis formed by the unequal production of the naked alternate branches. | 3. <i>D. pectinata</i> . |
| Primary branches bilaterally symmetrical as to branches. | |
| Primary branches once-forked, the terminal bud abortive; rachis flexuous; pinnules distant. | 4. <i>D. retroflexa</i> . |
| Primary branches 2-3-forked, a secondary leaf-axis often developed; rachis straight; segments close. | 5. <i>D. pteridella</i> . |
| Internodes (some or all) of primary branches at least partially pectinate. | |
| Primary branches simple or once-forked, wholly pectinate. | |
| Pinnules rigidly herbaceous, distant, conspicuously surcurrent. | 6. <i>D. orthoclada</i> . |
| Segments coriaceous or subcoriaceous, contiguous, slightly dilate. | |
| Segments linear, 2.5-3.5 cm. long; veins 20-40 pairs. | 7. <i>D. trachyrhizoma</i> . |
| Segments broader, 1-2.5 cm. long; veins 15-20 pairs. | 8. <i>D. intermedia</i> . |
| Primary branches mostly 1-4-forked, at least some of the internodes partially naked. | |

- Primary internodes less than 2 cm. long. 9. *D. farinosa*.
 Primary internodes 3 cm. or more long.
 Segments wholly glabrous. 10. *D. bicolor*.
 Segments, or at least the costae, not glabrous below.
 Pinnae less than 3.5 cm. broad.
 Small plants with ascending branches; pinnae not more than 13 cm. long. 11. *D. strictissima*.
 Larger plants with divaricate branches; pinnae longer.
 Leaf-tissue rigidly coriaceous. 12. *D. costaricensis*.
 Leaf-tissue herbaceous.
 Veins fibrillose-chaffy; leaf-tissue glabrous. 13. *D. Underwoodiana*.
 Veins and leaf-tissue minutely glandular-pubescent. 14. *D. jamaicensis*.
 Pinnae 3.5 cm. or more broad.
 Segments closely tomentose below, rarely glabrate with age. 15. *D. bifida*.
 Segments not tomentose below.
 Veins 40-50 pairs to each segment; costae densely chaffy. 16. *D. furcata*.
 Veins 20-35 pairs; costae lightly pubescent with stellate hairs.
 Scales of the rachis and internodes mostly ferruginous, laxly long-ciliate. 17. *D. palmata*.
 Scales of like parts mostly dark reddish-brown, rigidly spinescent-ciliate. 18. *D. mellifera*.

1. *Dicranopteris Bancroftii* (Hook.) Underw. Bull. Torrey

Club 34 : 252. 1907.

Gleichenia Bancroftii Hook. Sp. Fil. 1 : 5. 1844.

Mertensia Bancroftii Kunze, Linnaea 18 : 307. 1844.

Gleichenia Brunei Christ, Bull. Herb. Boiss. II. 5 : 13. 1905.

Dicranopteris Brunei Underw. Bull. Torrey Club 34 : 253. 1907.

Rhizome creeping, epigeous or somewhat subterranean, flexuous, up to 6 mm. in diameter, muricate, sparingly covered with brownish to light-castaneous lanceolate long-acuminate scales up to 7 mm. long, glabrescent; primary leaf-axis stout, about 5 mm. in diameter, stramineous, naked, or at the base brownish and somewhat scaly, bearing a pair of large bipinnate pinnae, axial growth sometimes continued from the included bud, a second and third pair of primary pinnae thus produced in acropetal succession; terminal (axial) bud large, up to 2 cm. long, densely clothed with whitish to dull-yellowish ovate to deltoid-lanceolate entire long-acuminate scales; pinnae determinate, oblong, 1-1.5 m. long, 30-50 cm. broad, acuminate, the rachis stout, smooth, up to 4 mm. in diameter, delicately bicarinate above; pinnules very numerous, normally inserted 2-3 cm. apart, approximate or slightly imbricate (rarely much smaller, congested, 1-1.5 cm. apart, closely overlapping), divergent, sessile, linear, 15-25 cm. long, 3-4.5 cm. broad, cut to the costa; costa stramineous, with a few deciduous slender deeply laciniate or filiform yellowish scales; segments rigidly herbaceous, very brittle, numerous, linear-ligulate, 1.5-2.25 cm. long, about 2.5 mm. broad, mostly adnate and decurrent (or the lowermost unequally constricted, subsessile), green or yellowish-green, glabrous or nearly so, glaucous below, the costule conspicuously elevated, stramineous, glabrescent; veins apart, once-forked near the base, the branches widely divergent; sori inframedial, seated upon the anterior branch, 3-5-sporangiate, a tuft of small filiform yellowish scales beneath.

TYPE LOCALITY : Jamaica.

DISTRIBUTION : Jamaica, Guadeloupe, and Martinique; on the continent extending from Mexico to Colombia, Venezuela, Ecuador, and Bolivia, mainly at altitudes of from 1000 to 1800 meters.

ILLUSTRATIONS : Hook. *loc. cit.* pl. 4A; Bull. Herb. Boiss. II. 5 : 287. f. 13 (as *G. Brunei*).

2. *Dicranopteris flexuosa* (Schrad.) Underw. Bull. Torrey

Club 34 : 254. 1907.

Mertensia flexuosa Schrad. Goett. Gel. Anz. 1824 : 863. 1824.

Mertensia rigida Kunze, Linnaea 9 : 16. 1834.

Gleichenia flexuosa Mett. Ann. Lugd. Bat. 1 : 50. 1863.

Gleichenia rigida Bommer & Christ, Bull. Soc. Bot. Belg. 35¹ : 174. 1896. Not *G. rigida* J. Smith, 1841.

A diffuse semi-erect plant with rigid branches; rhizome creeping, 2-5 mm. in diameter, light- to dark-brownish, slightly muricate from the detachment of very numerous decidu-

ous spreading castaneous articulate hairs; primary leaf-axis at first rigidly erect, stout, 2-4 mm. in diameter, firmly terete, light-brownish or somewhat stramineous, elongate; primary lateral branches several pairs, opposite, distant, repeatedly pseudodichotomous, a secondary leaf-axis invariably wanting, the internodes unequal, naked; primary internodes usually 6-8 (rarely 18) cm. long, the others successively shorter, the nodes stipulate at the upper side (the stipules narrow and subentire to deltoid and deeply pinnatifid), at the lower side provided with spreading or usually deflexed oblong-linear to lanceolate-oblong pectinate accessory pinnae, the larger ones 8-13 cm. long, up to 2.5 cm. broad, those of the upper nodes gradually smaller; pinnae sessile, ascending or somewhat divergent, variable, 12-23 cm. long, 2-6 cm. broad, attenuate, fully pectinate (the outer basal segments often prolonged and deeply pinnatifid), straight, subfalcate or slightly flexuous, linear to oblong-lanceolate, cut nearly to the rachis, glabrous throughout, light- or yellowish-green, glaucous below; segments variable in size, linear-oblong to linear, retuse, connected by a narrow wing at the dilatate base, the margins strongly revolute, sometimes meeting at the middle of the segment; veins 2-4-forked, close, elevated above, below deeply impressed; sori numerous if present, multisporeangiate, borne upon the distal and sometimes additionally upon the proximal veinlet of each group.

TYPE LOCALITY: Brazil.

DISTRIBUTION: General in the Greater Antilles, not common in the Lesser Antilles; on the continent extending from southern Mexico (rare) to Brazil, mainly at low elevations, rarely ascending to 1500 meters.

ILLUSTRATIONS: Mart. Ic. Crypt. Bras. *pl.* 60, *f.* 1; Sturm, in Mart. Fl. Bras. 12: *pl.* 17.

3. *Dicranopteris pectinata* (Willd.) Underw. Bull. Torrey Club 34: 260. 1907.

Mertensia pectinata Willd. Sv. Vet.-Akad. Handl. II. 25: 168. 1804.

Mertensia brasiliensis Desv. Ges. Nat. Freunde Berlin Mag. 5: 329. 1811.

Mertensia canescens Kaulf. Enum. Fil. 38. 1824.

Mertensia emarginata Raddi, Pl. Bras. 1: 72. 1825.

Gleichenia nitida Presl, Rel. Haenk. 1: 70. 1825.

Gleichenia brasiliensis Spreng. Syst. Nat. 4: 27. 1827.

Mertensia elata Desv. Mém. Soc. Linn. Paris 6: 201. 1827.

Gleichenia Hermannii Hook. & Grev. Ic. Fil. 1: *pl.* 14 (excl. syn.). 1827. Not *G. Hermannii* R. Br. 1810.

Mertensia nitida Presl, Tent. Pterid. 51. 1836.

Gleichenia Hookeri J. Smith, Lond. Jour. Bot. 2: 381. 1843.

A laxly ascending diffuse plant, forming extensive thickets; rhizome wide-creeping, 3-5 mm. in diameter, light brownish-castaneous, conspicuously scabrous from the persistent bases of numerous deciduous castaneous articulate hairs; primary leaf-axis at first erect, stout, 3-6 mm. in diameter, stramineous to light-brown, terete, elongate, eventually declining; primary lateral branches several pairs, opposite, stipulate, repeatedly and unequally pseudodichotomous, a falsely sympodial naked flexuous secondary axis formed by the alternate production of the unequal secondary branches, the shorter ones bearing a pair of pinnae or again unequally forked and bearing two pairs of pinnae; lower nodes of the lateral branches inconspicuously stipulate; included terminal bud of each dichotomy invariably abortive; pinnae variable, 10-25 cm. long, 1.5-6 cm. broad, sessile, fully pectinate (the outer basal segments often somewhat prolonged), subfalcate, unequally lanceolate or oblong-lanceolate to linear, attenuate, glaucous below (sometimes conspicuously so), glabrous to glabrate or (especially in narrow forms) having the costae and veins sparsely clothed with deciduous stellate or substellate slender ferruginous scales; segments variable in size, oblong to linear-oblong, connected by a narrow wing; veins 3-5-forked, slightly elevated below; sori numerous (or frequently altogether lacking), multisporeangiate, nearly medial, invariably borne upon the distal veinlet of each group.

TYPE LOCALITY: Near Caracas, Venezuela.

DISTRIBUTION: Of wide distribution in tropical America; general in the West Indies; on the continent extending from Mexico to Ecuador and Brazil. Polymorphic.

ILLUSTRATIONS: Sv. Vet.-Akad. Handl. II. 25: *pl.* 4; Hook. & Grev. *loc. cit.*; Raddi, *loc. cit.* *pl.* 6.

4. *Dicranopteris retroflexa* (Bommer) Underw. Bull. Torrey

Club 34 : 260. 1907.

Gleichenia intermedia flexuosa Baker, Jour. Bot. 25 : 24. 1887.*Gleichenia retroflexa* Bommer; Bommer & Christ, Bull. Soc. Bot. Belg. 35¹ : 175. 1896. — Christ, Bull. Herb. Boiss. II. 5 : 15. 1905.

Rhizome short-creeping, freely but intricately branched, slender, 2 mm. or less in diameter, brown, bearing a few small caducous thick broadly ovate entire brown scales and numerous roots; fronds numerous, 30–65 cm. high, weakly ascending, closely entangled; primary leaf-axis slender, 1–1.5 mm. in diameter, reddish-brown, wholly glabrous (like the entire plant), continuous; primary branches 3–5 pairs, 12–15 cm. apart in large fronds (much closer in others), spreading, once-pseudodichotomous, the internode 1.5–3.5 cm. long, straight, naked, but provided with several relatively large incised foliaceous stipules at the base, the pinnae fully pectinate and similarly stipulate; pinnae 7–22 cm. long, 3.5–8 cm. broad, widely divaricate (90–120°), the rachis slender, stramineous to light-castaneous, conspicuously, sharply, and regularly flexuose, each angle bearing a strongly retrorse pinule (at an angle of about 45°); pinnules bright- or yellowish-green, distant, linear, slightly narrowed at the base and sometimes a little surcurrent, 2–5 cm. long, 2–4 mm. broad, obtuse or acutish, the margins entire or rarely somewhat undulate or sinuate, often revolute in drying, the costule stramineous, elevated; veins 20–35 pairs, elevated, distant, mostly once-forked, the branches divergent; sori 3–5-sporangiate, medial or nearly so, seated upon the anterior branch, commonly protected by the widely revolute margins.

TYPE LOCALITY: La Palma, Costa Rica.

DISTRIBUTION: Rather widely distributed in the interior mountain region of Costa Rica, at from 600 to 2000 meters elevation.

ILLUSTRATIONS: Bull. Herb. Boiss. II. 5 : 15. *f.*; 6 : 287. *f.* 3.5. *Dicranopteris pteridella* (Christ) Underw. Bull. Torrey

Club 34 : 260. 1907.

Gleichenia pteridella Christ, Bull. Herb. Boiss. II. 6 : 284. 1906.

Rhizome undescribed; primary leaf-axis elongate, rigidly ascending, terete, subflexuous, yellowish or dull greenish-brown, glabrate, 2.5–3.5 mm. in diameter, 50 cm. or more long, continuous above, bearing 2 or 3 pairs of spreading primary lateral branches about 12–16 cm. apart; lower primary branches with a continuous (secondary) slender naked axis bearing 2 (or rarely 1) pairs of lateral branches, the first internode 2–3 cm. long, with simple stalked pinnae or once-forked branches at the node above, the second internode elongate (up to 11 cm. long), with small mostly twice-forked lateral branches at the node above, these with mostly short naked internodes and stalked pinnae; tertiary lateral axes normally abortive, the buds (as in the minor dichotomies) sharply ovate in outline, the scales dark reddish-brown, oblong-ovate, acute, with whitish ciliate margins; upper primary branches usually once-pseudodichotomous, the internode 2.5–4 cm. long, naked, the pinnae stalked (or very rarely the segments descending to the upper part of the internode), 15–22 cm. long, 3.5–4.5 cm. broad, lanceolate, acuminate, pectinate, slightly or not narrowed at the base, the rachis (like the internodes) nearly glabrous or with a few small scattered appressed scales like those of the buds; segments rigidly herbaceous, close, spreading or slightly decurved, linear from a slightly dilatate base, 1.5–2.4 cm. long, about 3 mm. broad, acutish, dull yellowish-green, much paler below, the margins entire and lightly revolute, the costa prominent below, yellowish, glabrate; veins about 25–32 pairs, subimmersed below, slightly elevated and conspicuous above, once-forked near the base; sori inframedial, seated upon the anterior branch, 4–6-sporangiate; leaf-tissue whitish-granulose below, bearing also minute scattered whitish simple or mostly substellate gland-like scales, these sometimes dark-centered.

TYPE LOCALITY: Costa Rica.

DISTRIBUTION: Interior mountain region of Costa Rica, up to 1450 meters elevation.

ILLUSTRATION: Bull. Herb. Boiss. II. 6 : 287. *f.* 12, representing a young state in which a continuous secondary leaf-axis is not developed.

6. *Dicranopteris orthoclada* (Christ) Underw. Bull. Torrey
Club 34 : 259. 1907.

Gleichenia intermedia dissitifolia Baker, Jour. Bot. 25 : 24. 1887.

Gleichenia orthoclada Christ, Bull. Herb. Boiss. II. 5 : 16. 1905 ; *loc. cit.* 6 : 282. 1906.

Rhizome short-creeping, closely branched, sparsely clothed with dark setaceous scales ; primary leaf-axes subfasciculate, slender, entirely glabrous (like the whole plant), shining, castaneous, 15–25 cm. long, continuous ; primary lateral branches 3–5 pairs, 5–8 cm. apart, simple or mostly once-pseudodichotomous, provided with foliaceous stipules at the base, pectinate throughout (including the internode, if present), 10–20 cm. long, 4–7 cm. broad, acuminate, narrowed at the base, the rachis yellowish, somewhat flexuous ; pinnules bright-green above, somewhat glaucous below, rigidly herbaceous, about 20–25 pairs, distant, 4–8 mm. apart, mostly at right angles (the lower ones somewhat reflexed), adnate, surcurrent, obtuse (or acute in drying), 2–3.5 cm. long, 3–4 mm. broad, the margins entire and often closely revolute, the costae yellowish, elevated ; veins 20–25 pairs, oblique, dark, evident upon both surfaces, forked near the base, the branches divergent ; sori mostly 3–5-sporangiate, casually 2- or 6-sporangiate, medial or supramedial, seated upon the anterior branch, apart from the costa ; receptacle slight, elevated.

TYPE LOCALITY : Costa Rica.

DISTRIBUTION : Known only from the interior mountain region of Costa Rica, at mid-elevations.

7. *Dicranopteris trachyrhizoma* (Christ) Maxon.

Gleichenia trachyrhizoma Christ, Bull. Herb. Boiss. II. 6 : 280. 1906.

Rhizome rather slender, finely tuberculate, densely clothed with rigid linear-lanceolate blackish-brown opaque divergent spinescent-ciliate scales ; primary leaf-axis elongate, rigid, subflexuous, at the base dark and somewhat tuberculate, above slender, together with the axes of the lateral branches sparsely and very minutely yellowish-furfuraceous and bearing a few thick deltoid acuminate spinescent-ciliate dark-brown scales, these subpersistent at the sides ; primary branches 2 pairs, about 10 cm. apart, the upper pair simple, sessile and fully pectinate upon both sides to the base ; lower pair once-pseudodichotomous (or sometimes simple), the internode 8–20 cm. long, fully pectinate upon both sides, both nodes provided with small deeply parted stipular segments 5–8 mm. long, the divisions of these slender and siliquiform in drying, the terminal bud small, abortive, clothed with small opaque deltoid-lanceolate dark reddish-brown spinescent-ciliate scales ; pinnae greatly elongate, up to 40 cm. long, 5–7 cm. broad, acuminate, slightly or not narrowed at the base, fully pectinate, the rachis light- or yellowish-brown, shining, sulcate above ; segments very numerous, subcoriaceous, fragile, spreading at right angles, separated by a broad sinus at the slightly dilatate base, linear, 2.5–3.5 cm. long, 1.5–2.5 mm. broad, dull-green, slightly glaucous below, the margins entire, unequally revolute, the costa very prominent, bearing a few minute roundish deeply fimbriate yellowish scales, glabrescent ; veins 20–40 pairs, dark, close, oblique, once-forked at an acute angle above the base ; sori mostly 3- or 4-sporangiate, medial, the receptacle yellowish and punctiform.

TYPE LOCALITY : Valley of the Rio Navarro, Costa Rica, altitude 1400 meters.

DISTRIBUTION : Costa Rica.

8. *Dicranopteris intermedia* (Baker) Underw. Bull. Torrey
Club 34 : 258. 1907.

Gleichenia intermedia Baker, Jour. Bot. 25 : 24. 1887.

Gleichenia axialis Christ, Bull. Herb. Boiss. II. 5 : 14. 1905 ; *loc. cit.* 6 : 283. 1906.

Rhizome undescribed ; primary leaf-axis elongate, rigidly erect, stout, 3–5 mm. in diameter, yellowish to reddish-brown, sulcate (or above compressed, the edges sharply carinate), wholly glabrous (like the entire plant), continuous ; primary lateral branches 3–5 pairs, 4–6 cm. apart, ascending, often strict and crowded, 14–20 cm. long, mostly once-pseudodichotomous in the lower fourth (the internode 2–4 cm. long), cut to the rachis, fully pectinate throughout, provided with large deeply and irregularly incised foliaceous stipules

at the base; segments coriaceous, 1–2.5 cm. long, linear-oblong or linear-deltoid and acute in drying, contiguous at the base, there 3.5–4.5 mm. broad, the margins entire and strongly revolute, the costa yellowish, elevated; veins 15–20 pairs, evident (especially above), mostly once forked near the base, the lower ones rarely 2–3-forked; sori about 15 pairs, 3–6-sporangiate, normally 5-sporangiate, nearly medial, borne upon the anterior branch; receptacle small, slightly elevated.

TYPE LOCALITY: Costa Rica.

DISTRIBUTION: Known only from the interior mountains of Costa Rica.

9. *Dicranopteris farinosa* (Kaulf.) Underw. Bull. Torrey

Club 34: 254. 1907.

Mertensia farinosa Kaulf. Wes. Farrenkr. 37. 1827.

Mertensia subtrisperma Fée, Mém. Foug. 11: 122. 1866.

Gleichenia farinosa Hook. Sp. Fil. 1: 9, in part. 1844.

Gleichenia subtrisperma Krug, Bot. Jahrb. 24: 78. 1897.

A small erect plant, 15–35 cm. high; rhizome 2–3 mm. in diameter, dark- or purplish-brown, shining, freely branched, tuberculate from the detachment of roots, deciduously paleaceous, the scales bright-castaneous, linear-lanceolate, ciliate; primary leaf-axis brownish, sparingly clothed with narrow yellowish-brown ciliate scales, glabrescent, bearing 2 or 3 pairs of mostly once-pseudodichotomous branches (the uppermost sometimes simple), the axis of the lowermost sometimes continued beyond the fork and bearing a second pair of simple pinnae; primary internodes 1–1.5 cm. long, pectinate upon the upper side, naked on the lower; pinnae 7–14 cm. long, 2–3.5 cm. broad, oblong-lanceolate, acuminate, incised nearly to the rachis; segments very coriaceous, slightly oblique, very close, linear-oblong, 1–1.8 cm. long, about 2.5 mm. broad, acute, glabrous above, below decidedly granulose, the particles subclavate, yellowish-white, persistent; rachises rather thickly clothed below with spreading linear-lanceolate deeply ciliate yellowish scales, the costae with a few dull-yellowish filiform scales; veins 20–25 pairs, once-forked near the costule, concealed, the overlying tissue elevated, the granular particles here elongate-clavate; sori 3- or 4-sporangiate, nearly medial, borne upon the anterior branch.

TYPE LOCALITY: Not known.

DISTRIBUTION: Guadeloupe and Martinique; not uncommon at altitudes of from 900 to 1450 meters. Ascribed also to Trinidad, probably with incorrectness.

ILLUSTRATIONS: Kunze, Anal. Pterid. pl. 3; Fée, loc. cit. pl. 32, f. 2.

10. *Dicranopteris bicolor* (Christ) Underw. Bull. Torrey

Club 34: 252. 1907.

Gleichenia bicolor Christ, Bull. Herb. Boiss. II. 6: 279. 1906.

Rhizome flexuous, densely clothed with shining atropurpureous lanceolate-subulate scales 5 mm. long; primary leaf-axis continuous, stout, 6 mm. or more in diameter, elongate, the lower portion clothed with spreading rigid scarioso ovate-subulate dark-brown white-margined scales up to 5 mm. long and with other yellowish-white scales, the upper parts with a dense covering of spreading broadly ovate-acuminate shining silvery-white scales, these often purplish at the base; primary branches several pairs, very ample, 2 or 3 times pseudodichotomous, the primary internode 5–11 cm. long, naked, densely paleaceous, the bud from this usually not prolonged as a secondary axis; secondary internodes 5–8 cm. long, usually naked; tertiary internodes 6–13 cm. long, fully pectinate like the pinnae; pinnae up to 33 cm. long, 7–10 cm. broad, narrowly oblong to lanceolate, incised nearly to the rachis, glabrous; segments very coriaceous, usually somewhat revolute in drying, linear, acute, wholly glabrous, very glaucous below, 3.5–5 cm. long, 3–3.5 mm. broad, dilatate at the base (5 mm. broad), joined by a wing 1–1.5 mm. broad on each side of the rachis; veins 25–50 pairs, dark, immersed, oblique, once-forked near the base; sori numerous, normally 5-sporangiate (casually 3- or 4-sporangiate), slightly inframedial, borne upon the anterior branch.

TYPE LOCALITY: Valley of the Rio Navarro, Costa Rica, altitude 1400 meters.

DISTRIBUTION: Interior mountains of Costa Rica; reported also from Tovar, Venezuela.

[ILLUSTRATION: The text figure by Christ, Bull. Herb. Boiss. II. 6: 287, f. 9, is incorrect; the primary internodes of the lateral branches are naked, the secondary usually so.]

11. *Dicranopteris strictissima* (Christ) Underw. Bull. Torrey

Club 34 : 261. 1907.

Gleichenia strictissima Christ, Bull. Herb. Boiss. II. 5 : 13. 1905.*Gleichenia glaucina* Christ, Bull. Herb. Boiss. II. 6 : 283. 1906.

A small slender plant, rarely more than 50 cm. high; rhizome very slender, about 1 mm. in diameter, dark-brown, widely creeping, branched, sparingly clothed with slender ciliate dark-brown scales; primary leaf-axis 1.5 mm. in diameter, dark-brown and similarly paleaceous, glabrescent, continuous, bearing 2 or more pairs of primary branches; lower primary branches about 20 cm. long, usually twice-pseudodichotomous, the primary internode about 3.5 cm. long and naked on the lower side, the secondary internode about 5.5 cm. long and fully pectinate, the pinnae about 10–13 cm. long, 1.5–2.5 cm. broad, lanceolate, falcate, long-acuminate, at the base somewhat attenuate, incised to within 0.5 mm. of the rachis; upper primary branches similar, the uppermost smaller, with the primary internodes usually pectinate upon the lower (as well as upon the upper) side nearly to the base; rachis glaucous, sparingly and deciduously paleaceous throughout, the scales divergent, lanceolate-subulate, ciliate, brownish or yellowish-brown, with reddish tips; segments coriaceous, oblique, close, deltoid-lanceolate, conspicuously so in drying, 8–13 mm. long, 3–4 mm. broad at the base, subacute, glabrous above, the margins subrevolute (or in drying sometimes strongly revolute), the under surfaces decidedly whitish-granulose (the particles subpersistent) and very sparingly setulose with scattered minute simple blackish hairs; veins 10–14 pairs, once-forked near the base, obscurely elevated; sori 9–12 pairs, 3–5-sporangiate, inframedial, borne upon the anterior branch; receptacle slightly elevated.

TYPE LOCALITY: Costa Rica.

DISTRIBUTION: Known only from the interior mountain region of Costa Rica, altitude 1300–1600 meters.

ILLUSTRATION: Bull. Herb. Boiss. II. 6 : 287, f. 7.

12. *Dicranopteris costaricensis* Underw. Bull. Torrey

Club 34 : 253. 1907.

Rhizome undescribed; primary leaf-axis stoutish, rigidly erect, 3–4.5 cm. in diameter, continuous, the lower portion brownish-castaneous, glabrous and shining, the upper portions light-brownish and thickly clothed with deciduous spreading deltoid-lanceolate attenuate long-ciliate yellowish scales; lateral branches 1 or 2 pairs, spreading, normally three times pseudodichotomous (secondary and tertiary axes invariably wanting), the divisions widely divaricate; primary internodes 4–9 cm. long, arcuate, 2.5 mm. in diameter, with several crowded stipuliform segments at the base, otherwise naked, deciduously paleaceous; secondary internodes widely divergent, 3.5–6.5 cm. long, sometimes naked, more commonly pectinate (at least in the lower half), stipulate; tertiary internodes 3–5 cm. long, fully pectinate, these and the pinnae densely paleaceous below, the scales similar in form to those of the upper primary leaf-axis, but bright-ferruginous, persistent, wide-spreading; pinnae linear, 10–30 cm. long, 1.25–2.7 cm. broad, attenuate, cut to the rachis; segments close, thick and rigidly coriaceous, dull dark-green above, subglaucous below, 7–14 mm. long, 4–6 mm. broad at the base, oblong to deltoid-oblong, obtuse (often appearing deltoid and acute in drying), the margins entire and widely revolute, the costae elevated and deciduously paleaceous; veins 8–11 pairs, evident below, mostly once-forked above the base, together with leaf-tissue obscurely setulose; sori normally 5-sporangiate, medial or slightly supramedial, apart from the costa, seated on the anterior branch.

TYPE LOCALITY: Volcan de Poas, Costa Rica, altitude 2600 meters.

DISTRIBUTION: Apparently confined to the upper slopes and summits of the high peaks of Costa Rica (volcanoes of Poas, Turrialba, Barba, and Irazú), altitude 2400–3000 meters.

ILLUSTRATION: Bull. Herb. Boiss. II. 6 : 287, f. 6 (as *Gleichenia revoluta* H.B.K.).13. *Dicranopteris Underwoodiana* Maxon, sp. nov.

A plant of medium size, 50–60 cm. high; rhizome wide-creeping, branched, 2–3 mm. in diameter, dark purplish-brown, lustrous, deciduously paleaceous, the scales reddish-brown, linear-lanceolate to deltoid-lanceolate, tortuous, rigidly ciliate; primary leaf-axis 2–3 mm. in diameter, slightly paleaceous at the base, reddish-brown, glabrate or (above the first

pair of branches) clothed with subpersistent narrow pale-rusty laxly spreading long-ciliate scales, these extending to the main vascular parts of the branches; primary lateral branches 2 pairs, about 14 cm. apart, twice pseudodichotomous, spreading, the primary internode 3–6.5 cm. long, slender, nearly naked, bearing one or several segments upon the upper side near the base and casually 1 or 2 at the base below; secondary internodes 3.5–10 cm. long, fully pectinate upon both sides, the included bud often conspicuous, rounded-oblong in outline, densely clothed with long-ciliate rusty scales; pinnae linear, slightly narrowed at the base, especially upon the inner side, 18–30 cm. long, 2.5–3.2 cm. broad, gradually attenuate, the rachises closely invested with short rusty chaff; segments 50–80 pairs, delicately herbaceous, dull dark-green above, paler and minutely granulose below, linear-oblong from a slightly broader base, scarcely joined, flattish, acutish or sharply apiculate in drying, the margins narrowly revolute, the costa relatively slight, clothed with deeply cleft rusty scales, the divisions slender; veins 12–15 pairs, dark-reddish and slightly elevated below, once-forked near the base, fibrillose with rusty stellate hair-like scales; sori mostly 4-sporangiate, casually 3- or 5-sporangiate, medial or slightly supramedial, seated upon the anterior branch, the receptacle relatively large.

Type collected at the border of forests, temperate regions of Chiapas, Mexico, 1864–1870, *Ghiessbreght* 271 (herb. D. C. Eaton).

DISTRIBUTION: Southern Mexico and the high mountains of Quiché, Guatemala.

14. *Dicranopteris jamaicensis* Underw. Bull. Torrey

Club 34: 258. 1907.

A small erect freely branched plant; rhizome widely creeping, freely branched, about 3 mm. in diameter, dark brownish-castaneous, with numerous imbricate subovate brownish-castaneous short-ciliate scales; primary leaf-axis continuous, 25–60 cm. long, 3 mm. in diameter, brownish to castaneous, polished, deciduously paleaceous, with 2 or 3 pairs of spreading lateral branches; lateral branches usually 2 or 3 times pseudodichotomous, or a secondary leaf-axis sometimes developed and bearing a pair of lateral branches similar to the usual branches of the primary leaf-axis; primary internodes 3–9 cm. long, nearly naked, bearing a few segments at the upper side of the base (rarely both above and below), deciduously paleaceous; secondary internodes 3–9 cm. long, pectinate upon both sides, or sometimes only partially so; tertiary internodes and pinnae fully pectinate, the rachises (beneath) and all the internodes densely paleaceous, the scales ferruginous to castaneous, more or less deciduous, lanceolate to ovate, deeply fimbriate, the cilia divergent; pinnae 10–24 cm. long, 2–2.5 cm. broad, linear to linear-lanceolate, usually falcate; segments rigidly herbaceous, contiguous, elongate-oblong, subacute, 8–13 mm. long, nearly 3 mm. broad, the margins entire and usually revolute, the costa scantily and minutely fibrillose-paleaceous, glabrescent; veins dark, slightly elevated, 12–15 pairs, once-forked near the base, bearing a few short simple glandular hairs; sori 3- or 4-sporangiate, medial, borne upon the anterior branch; leaf-tissue granulose, slightly and minutely glandular-puberulous.

TYPE LOCALITY: Summit of Blue Mountain Peak, Jamaica, altitude about 2225 meters.

DISTRIBUTION: Known only from Jamaica; forming extensive low thickets upon the upper slopes of the Blue Mountains, altitude 1600 to 2225 meters.

15. *Dicranopteris bifida* (Willd.) Maxon.

Mertensia bifida Willd. Sv. Vet.-Akad. Handl. II. 25: 168. 1804.

Gleichenia bifida Spreng. Syst. Veg. 4: 27. 1827.

Mertensia fulva Desv. Mém. Soc. Linn. Paris 6: 200. 1827.

Gleichenia brevipubis Christ, Bull. Herb. Boiss. II. 6: 280. 1906.

Dicranopteris cubensis Underw. Bull. Torrey Club 34: 253. 1907.

Dicranopteris fulva Underw. Bull. Torrey Club 34: 255. 1907.

A suberector ascending diffuse plant, forming extensive thickets; rhizome wide-creeping, 3–4 mm. in diameter, light or dark reddish-brown, sparingly clothed with slender short-ciliate antrorse scales and more or less tuberculate from the persistent bases of roots; primary leaf-axis at first erect, eventually declining, elongate, light greenish-brown, or at the base darker and deciduously chaffy like the rhizome, above covered at first with pallid rusty ciliate scales, these extending to the main vascular parts of the lateral branches,

imperfectly deciduous; primary lateral branches 2 or several pairs, once- or twice-pseudodichotomous, a secondary axis very rarely developed; primary internode of the larger lateral branches 2.5–7 cm. long, wholly naked or usually imperfectly pectinate upon the upper side and naked below, the segments commonly much reduced, mostly appearing as short triangular lobes, the lower side almost invariably naked; secondary internodes 3.5–11 cm. long, sometimes naked on both sides, more commonly pectinate throughout upon both sides, the several pairs of basal segments frequently much reduced (especially upon the inner side) or rarely altogether wanting upon the outer side of the internode; pinnae linear to linear-lanceolate, variable, 30–55 cm. long, 3–7 cm. broad, usually somewhat arcuate, attenuate, fully pectinate or rarely naked for a distance of 1–2 cm. at the outer base, the included bud clothed with pale rusty or rarely somewhat castaneous scales, the rachises stramineous to light-castaneous, lustrous, chaffy, the scales rusty, spreading, imperfectly deciduous; segments mostly linear from a dilatate base, once or twice their width apart from an obtuse sinus, slightly connected, straight or subfalcate, acutish or obtuse, covered below with rusty tomentum, this usually quite obscuring the venation or with age whitish and densely matted, sometimes disappearing; margins entire, closely revolute; veins numerous, 18–35 pairs, once-forked at the base, the branches apart, elevated below, scarcely evident above; sori 3- or 4- (rarely 5-) sporangiate, inframedial, borne upon the anterior branch, appearing imbedded in the tomentose covering of the segments.

TYPE LOCALITY: Near Caracas, Venezuela.

DISTRIBUTION: Common and generally distributed throughout the West Indies; from Mexico to Panama, southward into South America.

ILLUSTRATION: Willd. *loc. cit.* pl. 5, f. 4.

16. *Dicranopteris furcata* (L.) Underw. Bull. Torrey

Club 34: 257. 1907.

Pteris dichotoma L. Sp. Pl. 1076. 1753. Not *Dicranopteris dichotoma* Bernh. 1806.

Acrostichum furcatum L. Syst. Nat. ed. 10. 2: 1321. 1759.

Mertensia furcata Willd. Sv. Vet.-Akad. Handl. II. 25: 166. 1804.

Gleichenia furcata Spreng. Syst. Nat. 4: 25. 1827.

Mertensia grandis Fée, Mém. Foug. 11: 120. 1866.

Rhizome undescribed; primary leaf-axis erect, stout, 5–6 mm. in diameter, covered at first with numerous narrowly lanceolate fimbriate mostly yellowish scales, glabrescent, continuous, bearing 2 or 3 pairs of ample primary branches; primary branches once- or twice-pseudodichotomous, the primary internode about 3 cm. long, nearly naked, bearing only 2 or 3 small segments at the upper side of the node, deciduously yellowish paleaceous; secondary internodes up to 6 cm. long, fully pectinate upon both sides, up to 5 cm. broad, tapering somewhat toward the lower node; pinnae mostly divergent at an angle of about 60 degrees, fully pectinate, 15–25 cm. long, 4.5–8 cm. broad, lanceolate, attenuate, tapering slightly at the base, the rachis stout, brownish-stramineous, paleaceous, the scales like those of the primary leaf-axis; segments rigidly herbaceous, fragile, contiguous, linear, 2–4 cm. long, 3 mm. broad, the margins entire and closely revolute, the costa slightly paleaceous at the base, elsewhere lanose with deeply cleft long-ciliate yellowish scales; veins slightly elevated, 40–50 pairs, mostly once-forked, glabrous except for an occasional deeply ciliate minute scale; leaf-tissue below whitish-granulose, the particles unequally elongate; sori mostly 3-sporangiate, inframedial, borne on the anterior branch.

TYPE LOCALITY: Morne de la Calebasse, Martinique.

DISTRIBUTION: Martinique, Guadeloupe, and St. Kitts; upon the upper slopes of volcanoes at from 1200 to 1400 meters elevation.

ILLUSTRATION: Plumier, Traité Foug. pl. 28 (incorrect in showing the primary internode as fully pectinate above).

17. *Dicranopteris palmata* (Schaffn.) Underw. Bull. Torrey

Club 34: 259. 1907.

Mertensia palmata Schaffn.; Fée, Mém. Foug. 9: 40 (32), nomen nudum. 1857.

Gleichenia palmata Moore, Index Fil. 380, nomen nudum. 1862.

An erect freely branching plant of medium size; rhizome widely creeping, branched, 4 mm. or more in diameter, dark-brown, sparingly tuberculate, clothed with copious decidu-

ous linear-lanceolate to lanceolate-attenuate spinescent-ciliate castaneous scales; primary leaf-axis continuous, 60 cm. or more long, chaffy below, above glabrate, greenish to olivaceous, opaque, with 2 or 3 pairs of primary branches, these divergent at right angles; primary branches usually 2-4 times pseudodichotomous (or infrequently a secondary leaf-axis developed), the primary internodes 4.5-8 cm. long, stipulate on the upper side at the lower node, otherwise naked; secondary internodes 3.5-4 cm. long, diverging at an angle of 60 degrees, with 1 or 2 reduced segments at the lower node, otherwise naked; tertiary internodes 4-6 cm. long, diverging at an angle of 30-40 degrees, fully pectinate throughout like the pinnae; pinnae 20-25 cm. or more long, 3-5.5 cm. broad, tapering gradually, cut to the rachis; rachises sparingly clothed beneath with deciduous laxly long-ciliate mostly ferruginous scales, the scales of the internodes smaller, darker, with pale borders, and appressed; segments herbaceous, fragile, very close, linear, subacute, 1.5-2.8 cm. long, 2.5-4 mm. broad, bright-green, the margins entire and scarcely revolute; costae, veins, and leaf-tissue lightly pubescent with whitish 3- or 4-parted (stellate) hairs; veins 20-28 pairs, once-forked near the base; sori few, 3-5-sporangiate, nearly medial, borne on the anterior branch.

TYPE LOCALITY: Moist woods, Orizaba, State of Vera Cruz, Mexico.

DISTRIBUTION: Mountains of the State of Vera Cruz, Mexico, and Alta Verapaz, Guatemala. Known also from eastern Cuba (rare) and the Blue Mountains of Jamaica, altitude 1000-1650 meters.

18. *Dicranopteris mellifera* (Christ) Underw. Bull. Torrey Club 34: 259. 1907.

Gleichenia mellifera Christ, Bull. Herb. Boiss. II. 6: 281. 1906.

Rhizome undescribed; primary leaf-axis stout, erect, 6 mm. or more in diameter, reddish-brown to olivaceous, with a thin deciduous covering of slender tortuous scales; primary branches several pairs, 2 or 3 times pseudo-dichotomous, the primary internodes 6-10 cm. long, naked, not prolonged into a secondary axis, the secondary internodes 4-5 cm. long, naked except for 1 or 2 pairs of reduced segments at the node, the included bud small, reddish-paleaceous; tertiary internodes 5-10 cm. long, divergent at an angle of 45-60 degrees, these and the pinnae fully pectinate; pinnae 20-40 cm. long, 3.5-6 cm. broad, long-acuminate, cut to the rachis; rachises below sparingly clothed with slender reddish or reddish brown rigid spinescent-ciliate subappressed scales, all the internodes similarly clothed; segments rigidly herbaceous, fragile, spreading at right angles, linear, subacute, 1.75-2.5 cm. long, 3 mm. broad, close, strongly concave in drying or widely revolute, the margins entire; costae, veins and leaf-tissue sparsely pubescent with whitish or rusty 3- or 4-parted (stellate) hairs; veins 25-35 pairs, once-forked near the base; sori sparse, 3-5-sporangiate, slightly inframedial, borne on the anterior branch.

TYPE LOCALITY: Valley of the Rio Navarro, Costa Rica, altitude 1400 meters.

DISTRIBUTION: Known only from the interior mountain region of Costa Rica, at from 1300 to 1400 meters elevation.

ILLUSTRATION: Bull. Herb. Boiss. II. 6: 287, f. 10 (a portion of a lateral branch; incorrect in showing the secondary internode as fully pectinate).

DOUBTFUL OR EXTRALIMITAL SPECIES

Dicranopteris linearis (Burm.) Underw. Bull. Torrey Club 34: 250. 1907. (*Polypodium lineare* Burm. Fl. Ind. 235. pl. 67, f. 2. 1768. *Gleichenia linearis* Clarke, Trans. Linn. Soc. II. Bot. 1: 428. 1880. *Polypodium dichotomum* Thunb. Fl. Jap. 338. pl. 37. 1784; not *P. dichotomum* Houtt. 1783. *Dicranopteris dichotoma* Bernh. Neues Jour. Bot. Schrad. 1²: 49. pl. 3, f. 13. 1806. *Gleichenia dichotoma* Hook. Sp. Fil. 1: 12, in part. 1844.) The types of both *Polypodium lineare* Burm. and *P. dichotomum* Thunb. (the latter an invalid name) are Asiatic, the former Malayan, the latter from Japan. The American plant of this alliance, *D. flexuosa*, has been listed frequently as *Gleichenia dichotoma* and more recently as *G. linearis*.

Dicranopteris longissima (Blume) Underw. Bull. Torrey Club 34: 249. 1907. (*Gleichenia longissima* Blume, Enum. Pl. Jav. 250. 1828.) One of a group of closely allied species common in Asia and the islands of the Pacific. The type is from Java. *D. Bancroftii* has been referred to frequently under this name.

Gleichenia compacta Christ, Bull. Herb. Boiss. II. 5 : 254. 1905. Apparently a valid species; known only from Costa Rica, the type from the vicinity of La Palma, altitude 1600 meters, *Wercklé*. Not seen by the writer.

Gleichenia Mathewsii Hook. Sp. Fil. 1 : 9. *pl.* 7, *B.* 1844. Described originally from Peruvian specimens and ascribed by Hooker and Liebmann to southern Mexico. From description it appears to be a form of *D. bifida*. The Jamaican species wrongly described under this name by Jenman is *D. jamaicensis* Underw., a plant of wholly different vestiture.

Gleichenia pennigera (Mart.) Moore, Index Fil. 381. 1862. (*Mertensia pennigera* Mart. Ic. Crypt. Bras. 130. *pl.* 59, *f.* 1. 1834.) The type specimens are from the state of Minas Geraes, Brazil. Under this name have been listed in error (Bull. Soc. Bot. Belg. 32 : 105. 1893) specimens from Costa Rica, *Tonduz 3879*, which probably represent an undescribed species.

Gleichenia revoluta H.B.K. Nov. Gen. & Sp. 1 : 29. 1815. Described originally from the Quitensian Andes and probably confined to South America. The Costa Rican plant so reported is *D. costaricensis* Underw.

Gleichenia tenuis Presl, Rel. Haenk. 1 : 70. 1825. (*Mertensia tenuis* Presl, Tent. Pterid. 51. *pl.* 1, *f.* 7. 1836.) Described from specimens said to have been collected in Mexico and Martinique. Not identified.

Mertensia gleichenioides Liebm. Vidensk. Selksk. Skr. V. 1 : 296. 1849. (*Gleichenia Liebmanni* Moore, Index Fil. 379. 1862.) A remarkable form, accurately described by Liebmann from specimens collected by him near Cuaba, Vera Cruz, Mexico, and apparently not since collected. In general appearance the specimens differ widely from the usual type of *Dicranopteris* in the direction of *Gleichenia*, but not in venation and other characters. In minute characters they appear to represent a species not otherwise known, but in gross morphology the plant is almost certainly atypical and possibly indicates a reversion toward a general ancestral form. Plants similar in form, but very different in vestiture, have been collected in Jamaica by Professor Underwood and the writer; these were growing with *D. bifida* and from their minute characters must be reckoned a form of that species.

Mertensia pubescens H. & B.; Willd. Sp. Pl. 5 : 73. 1810. Described originally from Venezuela; according to Sturm and Underwood confined to South America. North American specimens of several species have often been listed under this name.

Family 5. CYATHEACEAE

BY WILLIAM RALPH MAXON¹

Mainly arboreous plants of humid tropical regions, the rhizome stout and woody, usually unbranched in our species, of complex fibrovascular structure, decumbent, ascending, or usually erect and from 1 to 15 meters or more high. Fronds several or numerous, borne in a crown, the stipes either articulate to the caudex and readily separable after maturity (in some species all falling together, seasonally), leaving definite scars, or imperfectly deciduous with age, the bases partially persistent and sheathing the thick caudex; laminae rarely simple, in our species bipinnatifid to quadripinnate, mostly 1 to several meters long. Sori indusiate or non-indusiate, essentially globose, borne upon the veins on the under surface of the lamina or by suppression of the leaf-tissue at the margin, the receptacle thus either dorsal or terminating the vein, elevated, of varying form, size, and vestiture. Sporangia numerous, usually crowded, radial in several ranks, ovoid, dehiscing horizontally, the annulus oblique, with or without a definite stomium of thin-walled cells. Spores triplanate.

Sori dorsal upon the veins, not marginal; indusium present, not formed in part of the modified leaf margin; cells of the annulus uniform or nearly so, a definite stomium wanting. (Tribe *Cyathea*.)

Sori indusiate, the indusium attached at the base of the receptacle.

Indusia either (1) cyathiform, never wholly enclosing the sporangia, persistent, or (2) globose, at first wholly enclosing the sporangia, rupturing at maturity, the divisions persistent to fugacious.

Indusia inferior, more or less semicircular in outline, often lobed, usually scale-like, never enclosing the sporangia.

Sori non-indusiate.

Sori terminal upon the veins, at or near the margin; indusium at least bilobed, the outer portion formed of a more or less modified lobule of the leaf-margin; annulus with a definite stomium of thin-walled cells. (Tribe *Dicksonieae*.)

Outer lip of the indusium formed of the slightly modified tissue of the leaf-margin.

Plants arborescent, the caudex 1 to many meters high; ultimate segments of the lamina nearly symmetrical.

Plants relatively small, the rhizome usually creeping; ultimate segments strongly asymmetrical.

Outer lip of the indusium similar to the inner, formed of highly differentiated tissue of the leaf-margin, the indusium rigid throughout and distinctly bivalvate.

1. CYATHEA.

2. HEMITELIA.

3. ALSOPHILA.

4. DICKSONIA.

5. CULCITA.

6. CIBOTIUM.

1. CYATHEA Smith, Mém. Acad. Turin 5: 416. 1793.

Sphaeropteris Bernh. Jour. Bot. Schrad. 1800²: 122. 1801.

Disphenia Presl, Tent. Pterid. 55, in part. 1836.

Schizocaena J. Smith, in Hook. Gen. Fil. pl. 2. 1838.

Eatoniopteris Bommer, Bull. Soc. Bot. France 20: xix. 1873.

Caudex erect in most species and often covered, at least below, with numerous adventitious roots, usually paleaceous toward the summit, and commonly armed with spines. Stipe often similarly spiny or muricate and paleaceous, at least in the lower part; lamina (in our species) bipinnate to quadripinnatifid, the pinnae spreading, the secondary rachises variously clothed, commonly glabrescent with age and darker below; pinnules subentire to deeply pinnatifid or pinnate, sessile to petiolate, deciduous or not, the segments (if any)

¹ With the assistance of preliminary descriptions and copious notes by the late LUCIEN MARCUS UNDERWOOD.

with a central costule bearing several pairs of simple to pinnately branched free veins. Sori dorsal, apart from the margin; indusium either (1) cyathiform, not wholly enclosing the sporangia, persistent, with even margins, or (2) globose, at first wholly enclosing the sporangia, bursting irregularly at maturity, the divisions persistent to evanescent, often only the basal portion subpersistent as a disk-like scale; receptacles of various form.

Type species, *Polypodium arboreum* L.

Indusia cyathiform, often deeply so, never wholly enclosing the sporangia, persistent, the margins entire.

Lamina bipinnate.

Caudex procumbent, 10–40 cm. long.

Fronds nearly or quite exstipitate; segments mostly adnate, coriaceous.

Fronds long-stipitate; segments short-stalked, chartaceous.

Caudex erect, 2–12 meters high.

Caudex slender, 2.5–3.5 cm. in diameter; lamina long-attenuate below.

Caudex stout, 8–20 cm. in diameter; lamina more abruptly reduced below.

Primary rachis pubescent or hirsute; segments close, adnate; costae pilose below.

Primary rachis furfuraceous; segments (pinnules) mostly auriculate; costae both paleaceous and pilose.

Lamina tripinnatifid or tripinnate.

Indusia shallow, more or less saucer-like at maturity.

Lamina tripinnatifid; pinnules 3 cm. or less long; veins 3–6 pairs, sori 1 or 2 to the segment.

Lamina tripinnate; pinnules 8–18 cm. long; veins 10–15 pairs to the segment, sori very numerous.

Indusia deeply cyathiform.

Lamina irregularly tripinnatifid; pinnae linear to linear-lanceolate, 7–8 cm. broad.

Lamina regularly and deeply tripinnatifid or tripinnate; pinnae lanceolate to oblong or deltoid-lanceolate, 13–24 cm. broad.

Indusia covered with long light-colored simple hairs.

Indusia glabrous without.

Segments deeply crenate-serrate to inciso-pinnatifid.

Pinnules 16–20 pairs, the larger ones deltoid-oblong and up to 4 cm. broad, the basal segments inciso-pinnatifid; sori large, distant.

Pinnules 25–35 pairs, lanceolate-oblong, up to 2 cm. broad; margins crenate-serrate; sori smaller, approximate.

Segments entire to crenulate or crenulate-serrate.

Secondary rachises conspicuously fibrillose-paleaceous below.

Secondary rachises not fibrillose-paleaceous below or obscurely so.

Leaf-tissue rigidly herbaceous; segments crenulate-serrulate, at least toward the apex; scales of the costules few, flattened, lacerate.

Leaf-tissue extremely coriaceous; segments entire to faintly crenulate; scales of the costules numerous, mostly bullate, apiculate or with dark spinous processes.

Costae densely brownish-strigose above; segments 9–10 mm. long, narrowly oblong, falcate; indusium glabrous.

Costae glabrous above; segments 7–9 mm. long, sub-falcate, closer; mouth of the indusium delicately whitish-araneose-ciliate at maturity.

Indusia globose, at first wholly enclosing the sporangia, rupturing at maturity, the divisions persistent, subpersistent or fugacious.

Segments mostly sessile or nearly so; tertiary rachises (costae) sinuate-alate.

Lamina deeply quadripinnatifid, *i. e.*, the segments cut nearly to the costules.

Lamina tripinnate, the segments not pinnatifid.

Segments lightly to deeply crenate-serrate, the larger ones subauriculate distally; veins pinnately branched.

Segments narrower, deeply crenate-dentate, mostly semihastulate by the prolongation of the distal basal lobe; veins mostly once-forked.

Segments mostly adnate, the costae not sinuate-alate.

Pinnules (or at least the lower ones) manifestly petiolate (these 4–10 mm.).

Pinnules lanceolate to linear-lanceolate, the costae deciduously paleaceous below.

1. *C. Nockii*.
2. *C. Brooksii*.
3. *C. minor*.
4. *C. pubescens*.
5. *C. balanocarpha*.
6. *C. jamaicensis*.
7. *C. arborea*.
8. *C. concinna*.
9. *C. portoricensis*.
10. *C. crassa*.
11. *C. elegans*.
12. *C. Tussacii*.
13. *C. cubensis*.
14. *C. nigrescens*.
15. *C. araneosa*.
16. *C. Werckleana*.
17. *C. hemiotis*.
18. *C. hastulata*.
19. *C. Tuerckheimii*.

- Pinnules elongate-deltoid to lanceolate-deltoid, the costae not paleaceous below.
- Primary and secondary rachises smooth or nearly so; pinnules 10-14 pairs, the larger ones elongate-deltoid; indusia subcoriaceous, opaque. 20. *C. gracilis*.
- Primary rachis spiny nearly throughout; secondary rachises mostly muricate; pinnules 17-21 pairs, deltoid-lanceolate; indusia membranous, lustrous. 21. *C. divergens*.
- Pinnules sessile or short-petiolate (3 mm., rarely).
- Pinnules cut to the costa nearly throughout, only the apical segments united by a very narrow wing.
- Secondary rachises densely furfuraceo-paleaceous, the squamose covering persistent. 22. *C. Imrayana*.
- Secondary rachises deciduously paleaceous or lightly furfuraceous, eventually glabrous.
- Primary and secondary rachises muricate or scabrous from the tuberculate bases of the slender deciduous scales.
- Pinnae 25-35 cm. broad; pinnules 13-18 cm. long, 1.7-3 cm. broad; segments 25-32 pairs; rachises coarsely muricate. 23. *C. princeps*.
- Pinnae 15-20 cm. broad; pinnules 10 cm. long or less, 1.3-1.8 cm. broad; segments 17-20 pairs; rachises finely scabrous. 24. *C. insignis*.
- Primary and secondary rachises smooth.
- Sori 2-4 pairs, basal upon the veins and segments; indusia brownish, membranous. 25. *C. caribaea*.
- Sori usually 8-10 pairs, medial, covering the segments; indusia whitish, coriaceous. 26. *C. Brunei*.
- Pinnules not cut to the costa or if so only at the base, the costae thus alate nearly throughout (at least narrowly so).
- Segments variously hairy upon the upper surface.
- Hairs of the upper surface of the segment confined to the costule.
- Costules with numerous spreading persistent hairs above; indusia hyaline, delicately membranous, the divisions mostly fugacious. 27. *C. tenera*.
- Costules with a few appressed deciduous hairs above; indusia brown, firmly membranous, the divisions persistent. 28. *C. dissoluta*.
- Hairs of the upper surface of the segment not confined to the costule.
- Costules conspicuously hairy above.
- Hairs above very long, confined to the costule and veins; costules clothed below with numerous whitish bullate scales, with long stiff whitish hairs intermixed. 29. *C. furfuracea*.
- Hairs shorter, lax, borne upon the costule, veins and leaf-tissue both above and below; costules bearing a few small deciduous fibrillose or laciniate rusty scales below. 30. *C. Harrisii*.
- Costules inconspicuously hairy above, or with age nearly glabrous.
- Pinnules deltoid-lanceolate, manifestly broadest at the base. 31. *C. Maxoni*.
- Pinnules oblong-lanceolate.
- Segments subentire or obscurely crenate, conform; costules bearing a few minute whitish scales below. 32. *C. onusta*.
- Segments sharply crenate-serrate, the proximal basal one usually semihastulate; costules clothed below with numerous whitish or light-yellowish scales. 33. *C. suprastrigosa*.
- Segments apparently glabrous above, or with a few (2-4) rigid hairs near the apex.
- Costules bearing bullate scales below, these often obscured by the confluent sori at maturity.
- Segments manifestly ciliate.
- Pinnules deltoid-lanceolate, broadest at the base, distant. 31. *C. Maxoni*.
- Pinnules oblong-lanceolate, mostly imbricate, larger. 32. *C. onusta*.
- Segments not ciliate (or in No. 34 the hairs beneath extending nearly to the margin).
- Veins 10-12 pairs to the segment.
- Scales of the costules whitish or light-yellowish, numerous; segments sharply bicrenate-serrate; veins obscurely setulose below. 33. *C. suprastrigosa*.
- Scales of the costules ferruginous, fewer; segments lightly crenate-serrate; veins copiously pilose below. 34. *C. aphlebioides*.
- Veins 7 or 8 pairs to the segment.
- Sori large, the indusium firmly membranous, persistent; costae below bearing large castaneous scales, long-pilose (at least in the outer part). 28. *C. dissoluta*.

- Sori small, the indusium delicately membranous and mostly disappearing; costae below sparingly and minutely paleaceous, obscurely pubescent, glabrescent.
- Pinnules oblong-lanceolate, 12-15 mm. broad. 35. *C. conspersa*.
- Pinnules linear-lanceolate, not more than 9 mm. broad. 36. *C. delicatula*.
- Costules not clothed with bullate scales below.
- Costae glabrous below; sori distinctly apart from the costule. 37. *C. Jurgensenii*.
- Costae squamulose or furfuraceous below, at least toward the base, and more or less pilose toward the apex; sori borne near to or against the costule.
- Indusia very firm, coriaceous, the main divisions mostly persistent; veins and margins bearing stellate hairs or minute stellate scales.
- Leaf-tissue rigidly coriaceous; pinnules lanceolate or deltoid-lanceolate, long-attenuate; veins and margins bearing minute stellate scales. 38. *C. aureonitens*.
- Leaf-tissue rigidly herbaceous; pinnules oblong, abruptly caudate; veins and margins bearing stellate hairs. 39. *C. punctifera*.
- Indusia membranous, the divisions largely evanescent; veins and margins not bearing stellate hairs or scales.
- Pinnae long-petiolate (4 cm. or more); pinnules about 20 pairs. 40. *C. Trejoi*.
- Pinnae sessile or short-petiolate; pinnules 30-40 pairs.
- Veins and leaf-tissue glabrous. 41. *C. patellaris*.
- Veins and leaf-tissue distinctly glandular-setulose below.
- Secondary rachises deciduously furfuraceous below, with slender deciduous whitish striped scales intermixed; costae not pilose below. 42. *C. basilaris*.
- Secondary rachises deciduously furfuraceous below, devoid of large scales; costae with at least a few antrorse hairs below toward the apex. 43. *C. mexicana*.

1. *Cyathea Nockii* Jenman, Jour. Bot. 17: 257. 1879.

Caudex 10-20 cm. long, 2-4 cm. in diameter, procumbent and rooting beneath, rough with the bases of old fronds, the crown clothed with numerous shining bright-brown lanceolate to ovate scales with a dark median stripe; fronds erect, cespitose, broadly oblanceolate, bipinnate, 40-110 cm. long, 12-25 cm. broad in the middle, tapering in both directions, the apex acuminate, the basal pinnae gradually much reduced and extending nearly or quite down to the caudex, the frond exstipitate or nearly so; primary rachis deeply sulcate, covered with grayish linear scales, these mixed with broader striped brownish scales below; pinnae numerous, spaced, spreading, the middle ones 6-12.5 cm. long, 1.5-2.3 cm. broad, lanceolate from a broad base, coriaceous, dark-green and glossy above, lighter below, pinnate, with about 14-20 pairs of segments below the rigid short-acuminate apex, the costa with both slender striped grayish scales and whitish bullate ones; segments slightly spaced, narrowly oblong, falcate, oblique, acute, mucronate, mostly adnate (only the lowermost free and deeply incised at the rounded base), the margins subentire, revolute, the costules with a few whitish bullate scales; veins about 7-10 pairs, evident, once-forked near the base, or the upper ones simple; sori 1-6 pairs, close to the costule, not reaching the apex; indusia subhemispheric, persistent; receptacles large, setiferous.

TYPE LOCALITY: Bellevue, near Cinchona, Jamaica.

DISTRIBUTION: Confined to the Blue Mountains of Jamaica; not uncommon upon steep forested slopes near Vinegar Hill, altitude 1000-1200 meters, also below Cinchona.

2. *Cyathea Brooksii* Maxon, Contr. U. S. Nat. Herb. 13: 24. 1909.

Caudex horizontal, mostly subterranean, about 40 cm. long, 3 cm. in diameter, with a few coarse cord-like roots below; fronds 2 or 3, long-stipitate, erect-arching, 125 cm. or more long; stipe 35-40 cm. long, brownish, clothed at the base with a few linear-lanceolate opaque dark-brown scales less than 1 cm. long, above dull yellowish-brown, minutely

furfuraceo-pubescent, sparingly fibrillose with long tortuous linear dark-brown scales, the rachis similarly fibrillose throughout; lamina lanceolate, fully bipinnate, about 90 cm. long, 30–38 cm. broad in the middle, tapering in both directions, the apex acute, the base somewhat reduced; pinnae about 40 pairs, nearly horizontal, sessile, the middle ones alternate, about 2 cm. apart on each side, ligulate, 17–19 cm. long, 2–2.5 cm. broad, the short-acuminate apex deeply serrate; lowermost pinnae subopposite, 4–6 cm. apart, 6–8 cm. long, 1–1.3 cm. broad; secondary rachises with a few linear dark-brown light-margined scales toward the base, elsewhere with dark-brownish stellate light-centered scales mingled with yellowish hairs; pinnules of the middle pinnae 40–45 pairs, slightly oblique, mostly short-stalked, the upper ones constricted above the rounded base and unequally hastulate, the lower ones fully hastulate and cut to the costa, the basal divisions rounded and free; margins subentire, only the apex of the pinnule regularly crenate-serrate; costae elevated, bearing stellate scales and hairs like those of the secondary rachis; veins 10–12 pairs, once forked near the base; sori 4 or 5 pairs, close to the costa; indusia dark reddish-brown, subhemispheric, open, firm, persistent; receptacle large, capitate.

TYPE LOCALITY: Forested slopes of Finca Las Gracias, Yateras, province of Oriente, Cuba, altitude about 500 meters.

DISTRIBUTION: Known only from the type specimens (*Maxon 4474*).

3. *Cyathea minor* D. C. Eaton, Mem. Am. Acad. II. 8 : 215. 1860.

Caudex very slender, 2–4 meters high, 2.5–3.5 cm. in diameter, rough, the scars spaced below, closer above, oval to ovate, 1.5–2.5 cm. long, 1–1.3 cm. broad, obscured at the apex by the short erect adnate fibrous stipe-bases of previous seasons; fronds 3 or 4, erect-spreading, broadly oblanceolate, bipinnate, 1–2 meters long, 20–40 cm. broad above the middle, the apex short-acuminate, the base gradually attenuate, the lower pinnae spaced, the lowermost vestigial and close to the caudex; primary rachis brownish or yellowish-brown, sulcate above, pubescent, unarmed except for the blunt protuberant bases of the minute basal pinnae; pinnae 30–45 pairs, close, horizontal, narrowly oblong-lanceolate, the largest 15–20 cm. long, 2.5–3.5 cm. broad, chartaceous, sessile, pinnatifid to the costa into about 30–35 pairs of segments below the deeply crenate attenuate apex, the costa densely covered with long yellowish-white hairs with whitish bullate scales intermixed; segments oblique, oblong, slightly falcate, mostly adnate, rounded at the base, entire (or the lowermost sometimes sessile and unequally crenate), obtuse, glabrous above, below sparingly, hirsute and with numerous small whitish bullate scales; veins evident, 10–12 pairs, once forked near the base or again half way to the margin, slightly hirtous; sori 4–7 pairs, close to the costule; indusia dark reddish-brown, deeply cyathiform, more or less pubescent, the margin even and somewhat constricted; receptacle small, enclosed.

TYPE LOCALITY: Monte Verde, Cuba.

DISTRIBUTION: Known only from the province of Oriente, Cuba, occurring on partially wooded slopes in the region known as the Yateras.

4. *Cyathea pubescens* Mett.; Kuhn, Linnaea 36 : 164. 1869.

Caudex stout, erect, up to 12 meters high, 15–20 cm. in diameter, prickly, densely tessellate with definite scars; fronds erect or erect-spreading, lanceolate, 2–2.5 meters long, 40–70 cm. broad in the middle, tapering in both directions, the apex short-acute, reduced rather abruptly at the base, the pinnae extending nearly or quite to the caudex; primary rachis brownish or castaneous, at the base chaffy with long narrow glossy brown scales and densely armed with stout curved spines, particularly upon the upper surface, the upper rachis rusty-puberulous and sometimes slightly muricate beneath, very densely yellowish-hirsute above with long filamentous yellowish-white scales intermixed; pinnae very numerous, approximate or somewhat imbricate, horizontal, ligulate, 20–35 cm. long, 2.5–3.5 cm. broad, sessile, rigid, comprising 60 or more pairs of segments below the serrate attenuate apex, the secondary rachis rusty-furfuraceous toward the base, rusty-pilose in the apical portion; segments coriaceous, dull-green, paler below, contiguous, elongate-oblong, falcate, subacute or acute, adnate, the margins sharply crenate-serrate or biserrate and subrevolute, or the lowermost segments free and deeply crenate; costae rusty-furfuraceous at the base, pilose

toward the apex with yellowish-white spreading hairs, these extending to the veins; veins evident, 15-18 pairs, close, forked at the base; sori small, 8-10 pairs, seated against the costule, contiguous, extending half way or more to the apex; indusia yellowish-brown, rigid, shallow, persistent; receptacles conspicuous, setiferous.

TYPE LOCALITY: Jamaica.

DISTRIBUTION: Common in the Blue Mountains of Jamaica, at altitudes of from 1500 to 2100 meters; also in Porto Rico, at the summit of El Yunque; reported from Haïti.

5. *Cyathea balanocarpa* D. C. Eaton, Mem. Am.
Acad. II. 8: 215. 1860.

Caudex erect, 2-4.5 meters high, 8 cm. or more in diameter, rough above with stipe-bases of previous seasons; fronds several, erect or slightly spreading, narrowly lanceolate, 1.5-2.5 meters long, 40-70 cm. broad in the middle, the apex acute or acuminate, the base short-attenuate, finally abruptly reduced, the basal pinnae short and distant; stipe 10 cm. or more long, 1-1.5 cm. in diameter, light-brownish, densely and minutely furfuraceous, armed with numerous stout ebeneous shining curved spines 4-6 mm. long, and clothed with scattering brownish linear-lanceolate scales 5-7 mm. long; rachis spiny or tuberculate at the base, above light-brownish, minutely furfuraceous; pinnae numerous, approximate, slightly oblique, sessile, narrowly deltoid-lanceolate, the middle ones 25-37 cm. long, 4-7 cm. broad, with 35-50 pairs of spaced pinnules below the crenulate caudate apex; pinnules linear-oblong, the lower ones straight, free, auriculate at the inner base, the margins irregularly and deeply dentate-crenate, the upper pinnules similarly auriculate, gradually adnate, subfalcate, the margins subentire or interruptedly sinuate-crenate; secondary rachises furfuraceous with small lacerate yellowish dark-tipped scales, with yellowish hairs intermixed; costae similarly clothed, but also with numerous yellowish bullate imbricate ciliate scales; veins evident, 12-18 pairs, close, 1-3-forked, or those of the lobes mostly pinnately forked; sori 8-15 pairs, near the conspicuously elevated costa, faced outward, occupying most of the pinnule; indusium hemispheric, reddish-brown with age; receptacle large, capitate, setiferous, protruding.

TYPE LOCALITY: Eastern Cuba.

DISTRIBUTION: Mountains of eastern Cuba, on partially wooded mountain slopes, at an altitude of from 1000 to 1200 meters.

6. *Cyathea jamaicensis* Jenman, Jour. Bot. 20: 323. 1882.

Caudex 3-4 meters high, "smooth and naked below, scaly at the top"; fronds ample, 2 meters or more long, 45-60 cm. broad, tripinnatifid, acuminate, tapering below, scarcely stipitate, the lower pinnae greatly reduced, the rachis pale-brown, smooth, glabrous; characteristic pinnae 30-40 cm. long, 5-6 cm. broad, sessile, spreading, approximate, acuminate, the secondary rachis pale-brown, appressed-hirsute above, below nearly naked, with a few reduced brownish stellate scales; pinnules strictly sessile, 2.5-3 cm. long, 8-12 mm. broad, lanceolate, deeply pinnatifid, the apex broad, serrulate or subentire, acute, the costa smooth or nearly so on both surfaces; segments 6-8 pairs, triangular to oblong, 2.5-3 mm. broad, unequal in length, the apex subacute, the costule bearing a few minute whitish bullate scales; veins 3-6 pairs to each segment, mostly simple; sori basal upon the lowermost veins, usually one or two to each segment; indusia small, dark-brown, shallow; receptacle stout, obconical, fragile, long-exserted beyond the even firm margin of the indusium.

TYPE LOCALITY: Vicinity of Mansfield, above Bath, Jamaica.

DISTRIBUTION: Known only from the type specimens (*Wilson 686*).

7. *Cyathea arborea* (L.) Smith, Mém. Acad. Turin 5: 417. 1793.

Polypodium arboreum L. Sp. Pl. 1092. 1753.

Disphenia arborea Presl, Tent. Pterid. 56. 1836.

Hemitelia arborea Fée, Mém. Foug. 5: 350. 1852.

Caudex erect, 4-12 meters high, the fronds usually in a close divaricate crown, articulate and readily separable, the caudex with about 8-10 ranks of close-set to tessellate, oval, rounded-ovate, obovate, or broadly subhexagonal, scabrous scars about 2-4 cm. in diameter,

or in young or rapidly growing plants the fronds strictly ascending, the stipes long-adnate, leaving a few distant elongate-elliptic scars up to 15-18 cm. long and about 4 cm. broad, or both types of scars evident in zones in the same individual; summit of the caudex, the spaces among the upper scars, and the bases of the stipes closely covered with lanceolate attenuate dirty-white scales up to 4 cm. long; fronds 2.5-4 meters long, the stipe very stout, low-tuberculate, yellowish-olivaceous, lighter above, succulent; lamina 2-3 meters long, tripinnate, the primary and secondary rachises more or less muricate, dull-yellowish, minutely furfuraceo-puberulous, quickly glabrescent, devoid of scales, the leaf-tissue light-green, delicately chartaceo-membranous, minutely papillate; pinnae mostly alternate, spreading, 40-80 cm. long, 16-35 cm. broad, oblong, abruptly acuminate, petiolate (1-3 cm.) or the basal ones exactly ovate and long-petiolate (up to 7 cm.); pinnules of the middle pinnae 20-26 pairs, all but the lower ones sessile (in the lower and basal pinnae these long-petiolate, up to 1.5 cm.), subimbricate, contiguous, or mostly approximate, spreading (or the lower ones somewhat retrorse), 8-18 cm. long, 1.5-3.5 cm. broad, lanceolate, oblong-lanceolate, or elliptic-lanceolate, usually broadest near the middle, the apex gradually long-attenuate and serrate, the costa finely furfuraceo-puberulous below but quickly glabrous, above scantily long-pilose; segments 20-32 pairs, linear-oblong (or if partially fertile often narrowly oblong-spatulate), subfalcate, dilatate, sharply and often deeply serrate, if very fertile the margin usually revolute, each tooth embracing a sorus; costules glabrous above, or with 1-3 spinous hairs near the apex, below uniformly with 1 or 2 deciduous white bullate scales at the base, elsewhere (together with the veins) very minutely glandular-setulose; veins 10-13 pairs, if fertile mostly once-forked below the middle, if sterile often 2- or 3-forked; sori numerous, 6-11 pairs; indusia light- or yellowish-brown, shallow, saucer-like; receptacle capitate, exserted, squamulose-setiferous, sometimes cleft.

TYPE LOCALITY: Le Morne de la Calebasse, Martinique.

DISTRIBUTION: General in the Greater and Lesser Antilles; rare in Mexico; variously reported from northern South America and intervening territory.

ILLUSTRATIONS: Plumier, *Traité Foug.* *pl.* 1, 2; Hook. *Sp. Fil.* 1: *pl.* 94 (as *C. Serra*).

8. *Cyathea concinna* (Baker) Jenman, Bull. Dep. Agr.

Jamaica 26: 4. 1891.

Cyathea arborea concinna Baker; Jenman, Jour. Bot. 19: 52. 1881.

Caudex erect, very stout, post-like, 4-6 meters high, 15-20 cm. in diameter, of uniform thickness and rough-surfaced throughout, the fronds freely deciduous, frequently all falling together seasonally, leaving close deep pit-like broadly oval scars, these rough with projecting fibrovascular bundles; stipe 2 cm. or less in diameter, 35 cm. or more long, light- or dark-brown, densely furfuraceous, darker at the base, with long (1.5-2.5 cm.) lanceolate bright-brown scariose-margined scales and relatively slender antrorse curved scattered dark-brown spines 9 mm. or less long, tuberculate above; lamina rather narrow, 2-3 meters long, 70-90 cm. broad, subcoriaceous, dark-green above, paler below, unequally tripinnatifid, the primary rachis pale-brown, pubescent and sparingly fibrillose above, below smoothish and lightly puberulo-furfuraceous, the secondary rachis similar, with a few deciduous lustrous brown lanceolate scales; pinnae numerous, alternate, close-set, sessile, linear to linear-lanceolate, 35-45 cm. long, 7-8 cm. broad, acuminate; pinnules 35-45 pairs, approximate or a little spaced, sessile, unequal in length (3-5 cm.) and width (4-9 mm.), lanceolate or linear-lanceolate, irregularly cut one half to three fourths the distance to the costa into about 14-17 pairs of close unequal oblong or deltoid-oblong subacute segments below the short or acute serrate apex, or, in fertile specimens, the lower half (excluding the outer basal segment) lightly and irregularly lobate, the lobes mostly unisoriate, the margins frequently incurved and embracing the sorus, the pinnule thus appearing oblanceolate or linear-spatulate; costa glabrous above or setose with a few appressed hairs, below pilose and paleaceous, the scales olivaceous or brownish, lanceolate or broader and somewhat bullate; costules similar below; veins few, mostly simple; sori basal upon the veins and segments; indusia deeply cyathiform, membranous, very fragile; receptacle large, equaling, or with age extruding from, the indusium.

TYPE LOCALITY: Below New Haven Gap (north), Jamaica.

DISTRIBUTION: Not infrequent in the Blue Mountains of Jamaica at altitudes of from 1500 to 2100 meters.

9. *Cyathea portoricensis* Spreng.; Kuhn, *Linnaea* 36: 163. 1869.

Caudex undescribed; fronds ample, the lamina nearly tripinnate, subcoriaceous, the leaf-tissue dark-green above, paler below and somewhat yellowish; stipe dark purplish-brown, toward the base armed with slender curved shining purplish spines, slightly muricate above, somewhat rusty-furfuraceous and sparingly clothed with flaccid fibrillose lacerate scales, these mostly deciduous; primary rachis similar in color, soon glabrescent, shining; pinnae subsessile or short-petiolate, oblong, rather abruptly acuminate, up to 65 cm. long and 21 cm. broad, the secondary rachis stout, similar to the primary, densely rusty-pilose above; pinnules approximate, 20-25 pairs, nearly equal, up to 10.5 cm. long, 2-2.5 cm. broad, sessile, elongate-oblong, acuminate, the costa rusty-pilose above, below sparingly dull whitish-pilose and toward the base bearing a few reduced brownish lacerate scales; segments about 20 pairs, oblique, 10-13 mm. long, about 3 mm. broad, elongate-oblong, obtuse, regularly crenate, the basal ones somewhat apart and sessile, those above dilatate but distinct, only the apical ones slightly connected; costules hairy below and minutely paleaceous like the costae; veins about 8 pairs, mostly once-forked below the middle, the branches widely divergent or the outer sterile ones 2 or (rarely) 3 times forked, these together with the under surface of the leaf-tissue rather densely clothed with dull whitish hairs; sori slightly inframedial, 3-6 pairs; indusium deeply cyathiform, yellowish-brown, chartaceous, densely covered with subpersistent simple yellowish-white hairs; receptacle slender, elongate, nearly equaling the even margin, obconical or slightly capitate, dark-brown, setiferous.

TYPE LOCALITY: Porto Rico.

DISTRIBUTION: Known only from the mountains of eastern Porto Rico.

10. *Cyathea crassa* Maxon, *Contr. U. S. Nat. Herb.* 13: 40. 1909.

Caudex erect, 3-8 meters high, spiny; stipe undescribed; rachis (at least in the upper part) castaneous, polished, glabrous; pinnae dark-green above, paler below, coriaceous, deltoid-lanceolate, 40-60 cm. long, 15-22 cm. broad, sessile, with about 16-20 pairs of pinnules below the abruptly acuminate apex, the secondary rachis brownish-castaneous, glabrous and shining on the under surface, above deeply sulcate, minutely dark-pilose, and with a few scattering minute castaneous stellate scales; pinnules contiguous or slightly apart, oblong to deltoid-oblong, 8-11.5 cm. long, 2-4 cm. broad at the base, sessile or essentially so, cut nearly or quite to the costa, the apex long-acuminate, serrate-crenate; segments 13-17 pairs, approximate or slightly apart, oblong, subfalcate, slightly oblique, obtuse, mostly adnate, the middle and lower ones decurrent, only the basal ones sessile, these the largest (up to 2 cm. long and 8 mm. broad), deeply inciso-pinnatifid (the lobes pinnately veined, sometimes with 2 basal sori), those above deeply inciso-crenate, the uppermost dentate-serrate; costae, costules, veins, and surfaces glabrous below; veins (excepting those of the basal segments) 1-3-forked, 6-8 pairs, mostly fertile; sori near the costule, large, distant; indusium castaneous, deeply hemispheric, rigidly coriaceous, persistent; receptacle capitate, somewhat hirsute, glabrescent, slightly included.

TYPE LOCALITY: Forests of Mount Izabel de la Torre, Santo Domingo, altitude 550 meters.

DISTRIBUTION: Known only from the type locality.

11. *Cyathea elegans* Hew. *Mag. Nat. Hist.* II. 2: 466. 1838.

Cyathea arborea pallida Hook. *Sp. Fil.* 1: 17. 1844.

Caudex erect, 3-7 meters high, 5-10 cm. in diameter, densely covered (especially in smaller plants) with old stipe-bases, the eventual scars rough with projecting fibrovascular bundles; stipe 10-30 cm. long, 2 cm. in diameter at the base, dark-brown, minutely puberulo-furfuraceous, bearing on the under surface a few deciduous subulate glossy dark-brown scales and armed with a few short long-pointed curved spines, and commonly bearing also a pair of abortive pinnae; lamina ample, 2-3 meters long, 90-130 cm. broad, chartaceo-coriaceous, tripinnate, dark-green, the rachis pale-brown, puberulous, smooth or below somewhat muricate, the secondary rachises similar; pinnae approximate, oblong-lanceolate, 45-70 cm. long, 15-22 cm. broad, sessile or the lowermost short-stalked (1-1.5

cm.) ; pinnules 25–35 pairs, approximate, sessile, patent, 8–10 cm. long, 1.2–2 cm. broad, lanceolate-oblong, cut nearly or quite to the costa, the apex serrate-acuminate, the costa brownish, densely long-setose above, below sparingly furfuraceo-paleaceous and pilose in the outer part with stiff yellowish hairs ; segments 18–20 pairs, subfalcate, oblong, slightly oblique, acute, the basal ones slightly apart and subsessile, the others approximate and adnate, the margins subrevolute, crenate-serrate, doubly so below ; veins (7–10 pairs) once- or twice-forked, naked ; costulae naked above, below bearing a few yellowish-brown bullate scales and stiff yellowish hairs ; sori near the costule at the forking of the veins, 4–6 pairs, occupying two thirds or less of the segment ; indusium very deeply cyathiform, or before maturity ovoid and greatly constricted at the mouth, membranous, pale-castaneous ; receptacle conical, dark-grayish, minutely furfuraceous.

TYPE LOCALITY : Mayday Mountains, Jamaica.

DISTRIBUTION : Apparently confined to Jamaica, there common in forests at from 300 to 1200 meters elevation.

ILLUSTRATION : Hook. Gen. Fil. *pl.* 23.

12. *Cyathea Tussacii* Desv. Mém. Soc. Linn. Paris 6 : 323. 1827.

Caudex 6–7 meters high, 10–15 cm. in diameter, rough, toward the crown very densely covered with sharp curved spines, the fronds deciduous (frequently all falling together seasonally), leaving large rough oval scars ; stipe very stout, 3 cm. or more thick at the base, 35–75 cm. long, curved, everywhere grayish-furfuraceous and densely armed with strong curved purplish-brown spines 6–9 mm. long, the inner side with numerous very narrow dark-brown scales ; lamina ample, 2.5 meters or less long, about 1.25 meters broad, slightly reduced at the base, tripinnate, coriaceous, dull-green above, grayish-green beneath ; primary rachis yellowish-brown, tuberculate near the base, above muricate, finely furfuraceous, conspicuously fibrillose with slender striped tawny or grayish scales ; pinnae numerous, alternate or subopposite, approximate or their bases imbricate, sessile or short-stalked (only the lowermost long-stalked, up to 15 cm.), lanceolate, 60–70 cm. long, 18–24 cm. broad, slightly oblique, short-acuminate, the secondary rachis yellowish, furfuraceous, similarly fibrillose (especially at the base) ; pinnules about 35 pairs, approximate or slightly spaced, 8–11 cm. long, 1.7–2.3 cm. broad, at the base fully pinnate, nearly so throughout, tapering rather abruptly in the outer fourth to a serrate-acuminate apex, the costa pilose and densely paleaceous, the scales pale-olivaceous, lanceolate to ovate ; segments about 22–24 pairs, narrowly oblong, 9–11 mm. long, 3.5–4 mm. broad, close, slightly falcate, subacute, the margins entire, subrevolute, the costule clothed like the costa ; veins 11–13 pairs, mostly once-forked near the base ; sori 1–3 pairs, at the forking of the veins, close to the costule and obscuring it, basal on the segment ; indusium deeply cyathiform, pale-brownish, membranous ; receptacle stout, setiferous, extruded with age.

TYPE LOCALITY : Jamaica.

DISTRIBUTION : Known only from Jamaica, there common in damp forest ravines of the Blue mountains, at from 900 to above 1800 meters elevation.

13. *Cyathea cubensis* Underwood, sp. nov.

Caudex 3–4 meters high, 8–12 cm. in diameter, appearing thicker from the clinging bases of old fronds, somewhat spiny ; definite stipe-scars rare, these rough with protruding fibro-vascular bundles or rarely smooth, elongate-oval, about 7 cm. long, 3.5 cm. broad ; stipe 25–35 cm. long, 2–3 cm. thick, pale- or yellowish-brown, densely rusty-furfuraceous, paleaceous at the base (the scales somewhat flaccid, pale-brown) and armed with numerous scattered nearly straight dark-brown spines below and at the sides, the upper surface unarmed ; lamina about 2.5 meters long, 1–1.25 meters broad, tripinnate, chartaceo-coriaceous, dark-green above, paler below, the primary rachis yellowish-brown, minutely furfuraceous, glabrescent, slightly spinescent toward the base, smooth above ; pinnae approximate, all but the lowermost sessile, 45–65 cm. long, 17–24 cm. broad, lanceolate, the apex long-acuminate, deeply serrate, the secondary rachis yellowish or pale-brown, slightly furfuraceous below, above sulcate, appressed-hirsute, and slightly fibrillose ; pinnules 25–30 pairs, approximate or a little apart, sessile or nearly so, 9–12 cm. long, 1.75–2.2 cm. broad, tapering

gradually in the upper third to a long-acuminate crenate-serrulate apex; segments 22–24 pairs, 10–12 mm. long, 4–4.5 mm. broad, oblong, straight or subfalcate, obtuse, the lowermost somewhat apart and sessile, those above adnate and mostly connected by a narrow wing, the margins crenulate-serrulate, at least toward the apex; costae yellowish, glabrate above, below sparsely and deciduously paleaceous, the scales small, yellowish or brownish, fimbriate, with larger narrower dark scales intermixed, especially toward the base; costules naked above, below sparsely paleaceous and sometimes slightly hairy in the outer part, the scales yellowish or brown, flattish; veins 9–11 pairs, once- or frequently twice-forked near the base, dark; sori close to the costule, 2–4 (5) pairs, usually at the base of the segment; indusium deeply hemispheric, pale-brownish, collapsing at maturity; receptacle large, setiferous, scarcely or not included.

Type collected on the slopes of El Yunque, Cuba, altitude 500–600 meters, March, 1903, *Underwood & Earle 1313*.

DISTRIBUTION: Common throughout the partially forested mountains of eastern Cuba, altitude 400 to 625 meters.

14. *Cyathea nigrescens* (Hook.) J. Smith, Ferns

Brit. & For. 242. 1866.

Cyathea arborea nigrescens Hook. Sp. Fil. 1: 17. 1844.

Caudex erect, 1–3 meters high, 10–12 cm. in diameter, long-spinescent and rough with bases of the slowly deciduous fronds, the stipe-scars rough with protruding fibrovascular bundles; stipe stout, 45–60 cm. long, 3 cm. in diameter at the base, dark purplish-brown, scurfy, armed with numerous stout purplish-black spines 1 cm. or less long and bearing copious rigid dark-brown shining deciduous scales at the base; lamina up to 2 meters long, 1–1.25 meters broad, tripinnate, rigidly coriaceous, above dark-green, below paler and somewhat glaucous, the rachis dark- or purplish-brown, lucid, puberulous, smooth or slightly muricate below, spinescent above; pinnae approximate, 45–65 cm. long, 15–20 cm. broad, lanceolate, sessile or the lower ones short-stipitate, the apex deeply serrate-acuminate; secondary rachis smoothish or slightly muricate below, dark purplish-brown, sparingly furfuraceo-paleaceous, glabrescent, above sulcate and densely hirsute with appressed brownish hairs, a few slender scales intermixed; pinnules about 30 pairs, approximate or slightly spaced, subsessile or the inferior short-stalked, 8–9 cm. long, 1.5–2 cm. broad, lanceolate, at the base fully pinnate, above cut almost to the costa, the apex acuminate-serrulate; costae yellowish-brown, brownish-strigose above, below yellowish, furfuraceo-paleaceous, glabrescent; segments about 20 pairs, 9–10 mm. long, narrowly oblong, falcate, obtusish, the lowermost spaced and sessile or short-stalked, those above adnate, the margins entire and strongly revolute; costules glabrous above, below paleaceous, especially toward the base, the scales yellowish-brown, bullate, deciduous, with occasional yellowish hairs intermixed and toward the apex; veins distinct, about 10–12 pairs, mostly once-forked near the base; sori close to the costule, usually 1 or 2 pairs, confined to the base of the segment, rarely several pairs ascending to the middle or beyond; indusia deeply hemispheric, brownish, membranous, persistent; receptacle stout, setiferous, scarcely included.

TYPE LOCALITY: Jamaica.

DISTRIBUTION: Confined to Jamaica; not uncommon in wooded and open situations in the central and western portions at altitudes of from 700 to 1500 meters.

15. *Cyathea araneosa* Maxon, sp. nov.

Caudex 3–4 meters high, very thick, densely covered with old stipes, rough and very spiny; stipe 30 cm. or more long, 2 cm. or more in diameter, dark-brown, deciduously furfuraceous, dark-paleaceous at the base and with numerous stout straight or slightly curved purplish-brown conical spines 7 mm. or less long, the rachis similar but smooth or muricate below, the reduced slender spines borne at the sides above; lamina 2 meters or more long, about 110 cm. broad, tripinnate, exceedingly coriaceous, brittle, lurid-green above, paler and glaucous below; pinnae alternate, approximate, 50–55 cm. long, 13–15 cm. broad, lanceolate, sessile, the apex short-acuminate; secondary rachis brownish below, slightly roughened and obscurely furfuraceous, glabrescent, above lighter, striate, densely covered

with stiff brownish appressed hairs ; pinnules 30-35 pairs, lanceolate, sessile, cut to the costa at the base, above scarcely so, the apex abruptly acuminate, crenate ; costae yellow, glabrous above, below stramineous, muricate, with a few deciduous linear-lanceolate purplish-brown appressed scales ; segments very close, 18-20 pairs, 7-9 mm. long, oblong, slightly falcate, the lowermost pair sessile, those above adnate and connected in the apical half by a narrow wing, the margins subentire, faintly crenulate at the apex, revolute, or the entire segment deeply concave ; costules glabrous above, below bearing a few yellowish-brown dark-tipped scales toward the base and lighter bullate ones toward the apex ; veins about 9 pairs, concealed, mostly once-forked near the base ; sori 1-3 pairs, at or near the base, close to the costule ; indusium light-brown, deeply hemispheric, slightly constricted, the margin entire, smooth and delicately whitish araneose-ciliate, glabrous with age ; receptacle stout, setiferous, short and included.

Type collected on partially open southern upper slopes and summit of the Gran Piedra, Oriente, Cuba, altitude 900 to 1200 meters, April 14, 1907, *Maxon 4035* (U. S. Nat. Herb. no. 522680).
DISTRIBUTION : Known only from this collection.

16. *Cyathea Werckleana* Christ, Bull. Herb. Boiss.

II. 6 : 181. 1906.

Caudex undescribed ; fronds ample, irregularly quadripinnatifid ; stipe stout, 2 cm. or more in diameter, light-castaneous, polished, armed with stout conical spines about 7 mm. in length, at the base thickly clothed with tortuous linear-subulate scales about 1 cm. long ; rachis castaneous, polished, delicately and minutely light puberulo-furfuraceous ; pinnae subsessile to petiolate (2 cm.), oblong, acroscopic, up to 75 cm. long and 25 cm. broad, acuminate, terminating abruptly in a pinnate apex, the secondary rachis like the primary ; pinnules about 35 pairs, rigidly herbaceous to subcoriaceous, dull dark-green above, below paler and subglaucous, deciduous, sessile, contiguous or slightly imbricate, linear-oblong, acuminate, 11-15 cm. long, 2.5-3.1 cm. broad (the superior ones longest), fully pinnate throughout, the costae minutely grayish puberulo-furfuraceous below, with a few greatly reduced substellate brownish scales ; segments deciduous, approximate or contiguous, wholly sessile, free, linear-oblong, 1.3-1.8 cm. long, 4-6 mm. broad, straight or in drying slightly falcate, subacute, subcordate at the base, above deeply and regularly serrate-lobate, the lobes (5-8 pairs) semiovate, acute, 2 mm. long, the margins usually entire, revolute, the costules like the costae ; veins pinnately branched, 2-5 pairs to each lobe ; sori minute, 1-3 to each lobe, nearly basal ; indusium delicately membranous, globose, rupturing readily, the fragments mostly disappearing ; receptacles dark, elevated, broadly capitate, grayish pilose-furfuraceous.

TYPE LOCALITY : La Palma, Costa Rica, altitude about 1500 meters.

DISTRIBUTION : Known only from the mountains of Costa Rica.

17. *Cyathea hemiotis* Christ, Bull. Herb. Boiss. II. 6 : 182. 1906.

Caudex undescribed ; fronds ample, tripinnate ; stipe stout, 2 cm. or more in diameter, castaneous, shining, armed with distant stout broadly conical spines about 5 mm. long and sparsely clothed with tortuous filiform brownish scales about 1 cm. long ; rachis castaneous or dark-purplish, polished, subfurfuraceous ; pinnae subsessile to petiolate (up to 2 cm.), up to 75 cm. long and 25 cm. broad, elongate deltoid-oblong, terminating very abruptly in an acuminate pinnate apex, the secondary rachis polished, castaneous, minutely and lightly puberulo-furfuraceous ; pinnules about 25-30 pairs, close (or in sterile specimens subimbricate), sessile, elongate-oblong, acuminate, 11-13 cm. long, 2-2.75 cm. broad, the costa appressed ferruginous-pilose above, below minutely and deciduously grayish puberulo-furfuraceous, narrowly sinuate-alate nearly throughout ; segments numerous, 25-30 pairs, rigidly herbaceous, dull dark-green above, paler and subglaucous below, approximate (closer in sterile specimens), rhomboid-oblong or narrowly so, subacute to acute, 1-1.4 cm. long, 4-6 mm. broad, falcate or subfalcate, mostly sessile or above semiadnate, the bases of the larger ones subcordate to unequally subauriculate, the margins lightly or deeply crenate-serrate, sometimes unequally so, the fertile segments least incised, the costules glabrescent ; veins about 10 pairs, concealed, 1-3 times pinnately forked, glabrate ; sori small, 3-5 pairs, close

to the costa; indusium globose, pale, membranous, bursting irregularly, quickly fragmentary or disappearing; receptacle elevated, subglobose, dark, deciduously grayish furfuraceous-pilose.

TYPE LOCALITY: Navarro La Luna, Costa Rica.

DISTRIBUTION: Known only from Costa Rica.

18. *Cyathea hastulata* Christ, Bull. Herb. Boiss. II. 4: 945. 1904.

Caudex and stipe undescribed; frond very ample, tripinnate; primary rachis stout, unarmed, purplish-castaneous, lustrous beneath a very short detergent rufous pubescence, the secondary rachises similar; pinnae subsessile to petiolate (2.5 cm.), narrowly oblong, about 70 cm. long, 22 cm. broad, very abruptly acuminate, the apex pinnate; pinnules about 30 pairs, dark-green above, rather lighter below, rigidly herbaceous, approximate, spreading, sessile, narrowly oblong, 11-13 cm. long, up to 2.5 cm. broad, acuminate or long-acuminate, the costae slender, very narrowly sinuate-alate, brownish, with a few lacerate grayish squamules; segments 20-23 pairs, distant, falcate, linear-oblong, 12-14 mm. long, about 3 mm. broad, sessile or at least constricted at the base, deeply crenate-dentate, the teeth obtuse, more than 1 mm. each way, the lowermost outer one usually produced to 2-3 mm. in length, the segment thus unequally hastulate; veins of the lower lobes pinnately forked, 2 or 3 pairs, in the upper lobes once-forked near the costule, both the costules and the basal portions of the veins grayish-squamulose; sori about 9 pairs, small, brownish, close to the costule, extending nearly to the apex; indusium globose, pale yellowish-brown, fragile, readily rupturing, the basal portion subpersistent, disciform; receptacle dark, elevated, globose-capitate, deciduously grayish squamulose-pubescent.

TYPE LOCALITY: Arias Agua Punta, Costa Rica.

DISTRIBUTION: Known only from Costa Rica.

19. *Cyathea Tuerckheimii* Maxon, Contr. U. S. Nat.

Herb. 13: 4. 1909.

Trunk and stipe wanting; fronds ample, at least 130 cm. broad, very deeply tripinnatifid; primary rachis yellowish-brown below, very densely furfuraceous with minute deciduous yellowish-brown scales and armed with numerous short (1-1.5 mm.) straight erect spines, tuberculate and glabrate with age; pinnae 65 cm. long, 25 cm. broad, petiolate (1.5-2.5 cm.), lanceolate, acuminate, the secondary rachis spinescent, clothed like the primary rachis; pinnules 11 or 12 cm. long, 1.7-2 cm. broad above the base, about 28-30 pairs below the deeply serrate apex, mostly short-petiolate (the lower ones 4 or 5 mm.), contiguous, narrowly lanceolate, attenuate, mostly at right angles, cut nearly to the costa, the costae yellowish-brown with a few minute short hairs and numerous very caducous glossy dark-brown ovate-lanceolate attenuate erose scales about 2 mm. long; segments about 20-22 pairs, rigidly coriaceous, narrow, 10-12 mm. long, 3-3.5 mm. broad, falcate, the basal ones separate, the others somewhat dilatate and connected by a narrow wing, the margins simply crenate-serrate, revolute in drying, especially toward the subacute apex, the costules clothed similarly to the costae, but the scales lighter in color (yellowish-brown), triangular-ovate, long-acuminate, somewhat bullate, with a few stout curved septate whitish hairs intermixed; veins of the segments 10 or 11 pairs, forked near the base, elevated, glabrate; sori large, yellowish, 6-9 pairs, occupying two thirds or more of the segment, seated at the forking of the veins; indusia membranous, rupturing irregularly, subpersistent; receptacles large, conspicuously hirsute.

TYPE LOCALITY: Near Coban, Alta Verapaz, Guatemala, altitude about 1350 meters.

DISTRIBUTION: Alta Verapaz, Guatemala, at from 1350 to 2000 meters elevation; region of Orizaba, Vera Cruz, Mexico, altitude about 1300 meters.

20. *Cyathea gracilis* Griseb. Fl. Brit. W. Ind. 704. 1864.

Caudex erect or decumbent, occasionally attaining a height of 3 meters, 5-7 cm. in diameter, clothed with the closely placed appressed dark-castaneous persistent stipe-bases of previous seasons; fronds 1.5-2.25 meters long, of lax habit, the leafy parts relatively very broad, spaced, and petiolate; stipe erect, spreading, 60-75 cm. long, light-castaneous,

darker toward the base, there tuberculate (otherwise unarmed) and clothed with large ovate attenuate dark-centered castaneous scales; lamina slender, 1-2 meters long, 60-90 cm. broad, tripinnate, chartaceo-coriaceous, dark-green, glabrous throughout except for the costae and costules, these densely ferruginous-pubescent above with somewhat appressed hairs, the costules also with a few deciduous lustrous brown bullate scales below; rachises light-brownish or light-castaneous, smoothish; pinnae lax, long-petiolate (3.5-5 cm.), 30-45 cm. long, 15-28 cm. broad, elongate-triangular, the apex serrate-acuminate; pinnules 10-14 pairs, petiolate, the lowermost the largest (up to 14 cm. long and 5 cm. broad) and long-petiolate (more than 1 cm.), those above narrower, finally deltoid-lanceolate; segments of the larger pinnules about 13 pairs, linear-oblong to lanceolate, nearly straight, the lowermost the largest (3 cm. long, 6 mm. broad), subsessile, distant, and often deeply incisoserrate (the apices subacute), those above gradually smaller, closer, adnate, finally connected by a broad foliar wing below the long serrate-acuminate apex; veins 10-12 pairs, mostly soriferous, 1 to 3 times forked or (in the largest segments) pinnately forked; sori numerous, large, single at the lowermost fork of the vein or in clusters of 2 or 3 upon the pinnately forked veins; indusium globose, firm, glaucous, bursting into several persistent saccate lobes; receptacle large, capitate, setiferous.

TYPE LOCALITY: Fox's Gap, Jamaica.

DISTRIBUTION: Forested slopes of the Blue Mountains of Jamaica, altitude 1500 to 1800 meters; gregarious in moist sheltered situations.

21. *Cyathea divergens* Kunze, Linnaea 9: 100. 1834.

? *Cyathea equestris* Kunze, Linnaea 9: 100. 1834.

Alosphila subaspera Christ, in Pittier, Prim. Fl. Costar. 3: 43. 1901.

Cyathea pelliculosa Christ, Bull. Herb. Boiss. II. 4: 946. 1904.

Caudex erect, 2.5-6 meters or more high, relatively slender, brown, not armed, the fronds divergent and somewhat drooping, articulate, leaving smoothish elliptic or narrowly oval scars 6-7 cm. long and 2.5-3 cm. broad, the spaces among these near the summit closely clothed with rigid subulate dark-brown scales (1-2 cm. long) with narrow whitish margins; stipe 60 cm. or more long, 2-3 cm. in diameter, paleaceous upon the upper side like the caudex, below densely armed with short sharp conical spines 2-3 mm. long, light-brown, closely and deciduously light brownish-furfuraceous, eventually more or less lustrous, the primary rachis yellowish-brown, similarly aculeate at least below, usually muricate above; lamina very ample, deeply tripinnatifid, the leaf-tissue rigidly coriaceous; pinnae petiolate (the lower ones up to 4.5 cm.), deltoid-lanceolate, the larger ones 60-75 cm. long, 20-28 cm. broad, acuminate, the secondary rachis dull- or brownish-stramineous, aculeate, sharply muricate, or smoothish below, above strigose; pinnules 16-21 pairs, distant, spreading, the lower and middle ones of the larger pinnae long-petiolate (3-9 mm.), 10-15 cm. long, 2.5-4 cm. broad at or near the base, deltoid-lanceolate, at least deeply tripinnatifid, the apex attenuate-acuminate, the costae densely strigose above, glabrous below; segments 16-20 pairs, subfalcate, oblong to linear-oblong, the lower pair or two the largest, semiadnate to sessile, apart, 4-5 mm. broad, those above fully adnate, closer and connected by a gradually widening wing 1.5-2.5 mm. broad upon either side of the costa, or all the segments adnate and connected, separated by narrow acute sinuses, these appearing wider from the revolute subentire to crenulate-serrate margins, the apices obliquely subtruncate, usually subacute in drying; costules yellowish and glabrous above, below dark, glabrous, or with an occasional reduced slender brownish deciduous scale; veins about 10-13 pairs, mostly setiferous, dark, close, oblique, mostly 1- or 2-forked, glabrous; sori large, seated at the forking of the veins, inframedial (or the lower pair or two distant from the costule), strongly confluent at maturity; indusia globose, yellowish-brown, lustrous, membranous, bursting irregularly, the divisions delicate but mostly persistent; receptacles large, capitate, conspicuously long-hirsute with beaded hairs.

TYPE LOCALITY: Pampayaco, Peru.

DISTRIBUTION: Costa Rica, up to 2700 meters altitude; Peru; reported also from Ecuador and Colombia.

ILLUSTRATIONS: Hook. Sp. Fil. 1: pl. 11A; ? Kunze, Farrnkr. pl. 76 (as *C. equestris*).

22. *Cyathea Imrayana* Hook. Sp. Fil. 1: 18. 1844.

Caudex stout, erect, paleaceous at the summit; stipe short, slightly aculeate, very densely and closely dark rusty-furfuraceous, paleaceous at base; lamina ample, 2-3 meters long, 1.2-1.3 meters broad, ovate, very abruptly acuminate, tripinnate, coriaceous, very dark-green above, light yellowish-green and glaucous below; primary and secondary rachises very stout, brownish to purplish beneath a dense harsh persistent conspicuous covering of small rusty-brown squamules and small linear scales; pinnae 60 cm. or more long, 18-20 cm. broad, sessile or nearly so, linear-oblong, abruptly acuminate, the apex deeply serrate; pinnules about 35 pairs, approximate or contiguous, sessile, spreading, 10-11 cm. long, about 1.8 cm. broad, fully pinnate, the apex long-acuminate, the costae densely furfuraceous and in the lower half clothed with small linear light-brownish striped scales; segments about 25-28 pairs, linear-oblong, falcate, close, fully adnate, 9-10 mm. long, 3 mm. or less wide, the margins reflexed, subentire, faintly crenate at the obtuse apex, the costules below densely rusty-furfuraceous, obscurely rusty-pilose; veins close, distinct, about 12-15 pairs, once-forked at the base; sori 1 to several pairs, close to the costule, usually extending half the length of the segment; indusia globose, reddish-brown, fragile, membranous, rupturing irregularly; receptacle globose, dark, closely puberulo-furfuraceous.

TYPE LOCALITY: Couliaban Mountain, Dominica.

DISTRIBUTION: Guadeloupe, Dominica, and Martinique.

ILLUSTRATIONS: Hook. Sp. Fil. *pl.* 9B.

23. *Cyathea princeps* (Linden) E. Mayer, Gartenflora 17: 10. 1868.

Cibotium princeps Linden; E. Mayer, Gartenflora 17: 10, as synonym. 1868.

Cyathea Bourgaei Fourn. Mex. Pl. Crypt. 135. 1872.

Cyathea Munchii Christ, Bull. Herb. Boiss. II. 7: 413. 1907.

Caudex stout, erect, said to attain a height of nearly 20 meters; fronds 4 meters or more long, in a large crown; stipe 1-1.5 meters long, together with the yellowish primary and secondary rachises densely clothed with stramineous or yellowish narrow membranous spinescent spreading or retrorse scales, unarmed but coarsely muricate from the tuberculate bases of the deciduous scales; lamina ovate, acuminate, 2-2.5 meters long, tripinnate; pinnae numerous, close, up to 1 meter long, 25-35 cm. broad, long-stalked, oblong-lanceolate, acuminate; pinnules very numerous, approximate or slightly spaced, 13-18 cm. long, 1.7-3 cm. broad, linear-oblong, long-acuminate or attenuate, incised nearly throughout quite to the costa, the costa sparingly clothed below with simple spinescent or generally deeply cleft yellowish or reddish membranous deciduous scales, above appressed-hirsute; segments 25-32 pairs, narrowly oblong, falcate, usually dilatate at the base, somewhat spaced, glaucous and granulose below, subentire, obtuse, usually appearing acutish from the slightly revolute margins, the costules with a few deciduous simple or deeply cleft filamentous light-castaneous or reddish scales; veins 10-12 pairs, a little elevated, mostly once-forked below the middle, rarely 2- or 3-forked; sori large, 6-9 pairs, seated at the forking of the veins; indusia coriaceous, reddish-yellow, rupturing part way to the base into a few (2-4) persistent saccate lobes, these appearing like valves; receptacles prominent, setiferous.

TYPE LOCALITY: On the volcano Tuxetla, Vera Cruz.

DISTRIBUTION: Provinces of Vera Cruz and Chiapas, Mexico; Guatemala (Alta Verapaz); and, according to Sell, in Costa Rica, the last very doubtful.

24. *Cyathea insignis* D. C. Eaton, Mem. Am.

Acad. II. 8: 216. 1860.

Caudex stout, 5-6 meters high, 10-15 cm. in diameter, unarmed, densely clothed at the summit with linear spinulose-ciliate cinnamon-brown matted scales; fronds wide-spreading; stipe 30-60 cm. long, stout, strongly curved, unarmed but eventually scabrous from the very dense covering of spreading or retrorse scales like those of the caudex, naked with age, toward the base reddish-brown, above mottled reddish and yellowish; lamina 2-2.5 meters long, 1-1.25 meters broad, very deeply tripinnatifid, subcoriaceous, dark-green above, paler and decidedly glaucous below; primary rachis similar to the upper stipe, moderately palea-

ceous, glabrescent, flexuous toward the apex; secondary rachises similar, yellowish, rusty-tomentose above, finely scabrous below; pinnae alternate, sessile, approximate or slightly overlapping, 45–75 cm. long, 15–20 cm. broad, oblong-lanceolate, decurved in the outer part, the apex abruptly acuminate; pinnules 25–28 pairs, close, patent or the lower ones decurved, sessile, linear-lanceolate, 7.5–10 cm. long, 1.3–1.8 cm. broad, a little enlarged at the base, incised to the costa nearly throughout, the apex commonly attenuate or subcaudate, crenate-serrate; costae and costules with numerous lacinate cinnamomeous scales; segments 17–20 pairs, 7–9 mm. long, 3–4 mm. broad, oblong, oblique, close, falcate, entire or the lowermost crenately incised, these enlarged and overlapping the rachis, deeply excised at the inner base; veins 7–10 pairs, mostly once-forked, nearly glabrous; sori 4–8 pairs, medial or inframedial, nearly covering the segment, seated at or below the forking of the veins; indusia subglobose, papyraceous, whitish, conspicuous, at first completely enveloping the sporangia, at maturity opening outward and readily breaking up into several irregular subpersistent segments; receptacle short, inconspicuous.

TYPE LOCALITY: La Guinea, eastern Cuba.

DISTRIBUTION: Eastern Cuba and Jamaica. Apparently rare in Cuba; in Jamaica not uncommon at certain points in the Blue Mountains, at from 900 to 1800 meters elevation, growing in open or moist shaded situations.

25. *Cyathea caribaea* Jenman, Ferns Brit. W. Ind. 57. 1898.

Caudex erect, about 6 meters high; fronds spreading, very ample, sometimes more than 4 meters long; stipe stout, with large spines below; primary rachis stout, purplish, slightly furfuraceous; pinnae 60 cm. or more long, 18–23 cm. broad, oblong, sessile, abruptly acuminate, very dark-green above, lighter and glaucous below, coriaceous, the secondary rachis stout, firm, purplish, polished, lightly and very minutely light brownish-furfuraceous; pinnules very numerous, approximate, sessile, 8–12 cm. long, 1.3–2 cm. broad, deeply cut almost to the costa into about 22–28 pairs of segments below the subcaudate serrate apex; segments elongate-oblong, falcate, close or the lower ones a little apart, 7–10 mm. long, about 2.5–3 mm. broad, slightly dilatate, the margins reflexed, subentire, or at the obtuse apex crenulate; costae yellowish-brown, pilose on both surfaces, the lower also minutely stellate-squamose and with a few slender dark-brown striped deciduous scales, the costules pilose and similarly squamulose; veins 8–10 pairs, mostly once-forked close to the costule, casually simple or twice-forked; sori 2–4 pairs, basal on the veins and confined to the base of the segments; indusium globose, delicate, yellowish-brown, bursting irregularly, the large divisions scarcely persistent; receptacle elevated, slightly capitate, setiferous.

TYPE LOCALITY: St. Vincent.

DISTRIBUTION: Known definitely only from St. Vincent.

26. *Cyathea Brunei* Christ, Bull. Herb. Boiss. II. 4: 497. 1904.

Cyathea caesia Christ, Bull. Herb. Boiss. II. 7: 272. 1907.

Caudex erect, 3–4 meters high, 30 cm. or more in diameter at the summit, there very densely paleaceous, without definite scars, the old fronds pendent and sheathing the caudex; fronds 3.5–4 meters long, borne in a nearly erect crown; stipe 5 cm. in diameter at the base, dark purplish-brown below, sparsely tuberculate beneath a very dense covering of delicate flaccid yellowish-brown scales, these (paler with age) up to 6 cm. long and 3.5 mm. broad, linear-lanceolate, very long-attenuate, widely spreading, underlaid by successively smaller scales, the innermost greatly reduced, dark-brown, subulate, conspicuously spinescent-ciliate, subpersistent; lamina about 3 meters long, 1.7 meters broad, broadly ovate, abruptly acuminate, the primary rachis stout, dull-yellowish or brownish, glabrescent, when young densely paleaceous, the scales small, dark-brown, closely entangled, long spinescent-ciliate, usually persistent in a long tuft at the base of the pinnae and extending throughout the stout yellowish secondary rachis, there deciduous or at the base of the pinnules subpersistent; pinnae mostly alternate, the lowermost subopposite and somewhat reduced (40 cm. long), long-petiolate (6–9 cm.); characteristic pinnae 70–100 cm. long, 20–30 cm. broad, petiolate (2–5 cm.), oblong-lanceolate from a broad base, acuminate, caudate; pinnules about 40 pairs, 10–15 cm. long, 1.5–2.5 cm. broad, narrowly oblong-

lanceolate from a broader base, long-acuminate, cut to the costa, the lowermost short-petiolate (3 mm. or less) and distant, those above gradually closer, sessile; costae sparingly clothed with lacinate or long spinescent-ciliate deciduous fulvous scales, these extending to the costules; segments mostly linear-oblong, falcate, obtuse, the fertile ones narrower (1-1.4 cm. long, 2.5-3 mm. broad) and apart, about 25-30 pairs, coriaceous, the margins somewhat thickened, subrevolute, entire or (in fertile segments) obscurely crenate, the leaf-tissue minutely but densely whitish granulose-ceraceous below, also minutely glandular-setose; veins concealed, 10 or 11 pairs, once- or twice-forked; sori medial, completely covering the segment; indusium globose, firm, whitish or with age pruinose-brownish, bursting into several large inflexed persistent saccate lobes; receptacle brownish, elevated, relatively small, squamulose-pilose.

TYPE LOCALITY: Costa Rica.

DISTRIBUTION: Not uncommon in the humid interior mountain region of Costa Rica, altitude 1450 to 2000 meters.

27. *Cyathea tenera* (J. Smith) Griseb. Fl. Brit. W. Ind. 704. 1864.

Alsophila tenera J. Smith; Hook. Sp. Fil. 1: 49. 1844.

Cyathea barbata Bory; Mett. Linnaea 36: 164. 1869.

Cyathea hypotricha Christ, Bull. Herb. Boiss. II. 4: 947. 1904.

Caudex erect, up to 8 meters high, somewhat spiny, clothed at the summit with copious bright-brown long linear chaff; stipe divergent, stout, 2 cm. in diameter, 40 cm. or more long, castaneous to dull-brownish, paleaceous below with bright-brown linear-lanceolate scales, freely asperous with short straight spines; lamina ample, variable in size and cutting, the apex short-acuminate, the primary rachis sparsely aculeate or muricate, minutely furfuraceo-pubescent, glabrescent, olivaceous to dull-reddish; pinnae numerous, alternate, approximate or contiguous, subsessile or short-petiolate, the larger ones 30-45 cm. long, 13-16 cm. broad, oblong, acuminate, the secondary rachis olivaceous or yellowish-brown, muricate or smoothish, closely pubescent, glabrescent; pinnules about 23-28 pairs, approximate or apart, subsessile or short-petiolate, 7-10 cm. long, 1.2-1.7 cm. broad, elongate-oblong, short-acuminate, very deeply pinnatifid, the costa pilose above with subappressed yellowish hairs, below (together with the costules and veins) clothed with numerous long spreading rigid whitish hairs, the costules also with a few minute bullate yellowish-brown scales below and numerous spreading hairs above; segments 13-17 pairs, oblong, subfalcate, close, sometimes dilatate, separated by a narrow sinus, obtuse, the margins manifestly crenate-serrate; veins 5-8 pairs, simple or once-forked; sori small, 4-6 pairs, slightly inframedial; indusium globose, membranous, exceedingly delicate, rupturing readily at maturity and commonly disappearing, excepting only a small inferior disciform subpersistent remnant; receptacle small, globose, short.

TYPE LOCALITY: St. Vincent.

DISTRIBUTION: General in the Lesser Antilles and Trinidad; known also from Cuba and Costa Rica. Variable.

28. *Cyathea dissoluta* Baker, Jour. Bot. 19: 52. 1881.

Caudex slender, 2-3 meters high, 5-7 cm. in diameter, the apex clothed with castaneous scales and rough between the nodular protuberances at the base of the distinct oval stipe-scars; vegetative reproduction by small frondiferous lateral branches, these decurved from the caudex, finally falling and giving rise to independent new plants; stipe slender, 30 cm. or less long, brownish-castaneous, strongly decurved at the base and closely covered with castaneous scales, prickly with short straight spines, above tuberculate, glabrate; lamina 1-1.5 meters long, 40-75 cm. broad, deeply tripinnatifid, chartaceous, dark-green, the primary rachis castaneous, nearly smooth, glabrous; pinnae approximate or overlapping, short-petiolate (1-2 cm.), 20-38 cm. long, 10-16 cm. broad, deltoid-oblong, short-acuminate, the secondary rachis dull light-brownish, sparsely muricate or smoothish, glabrous below, the upper surface with appressed rusty hairs; pinnules about 20 pairs, approximate, sessile or the lower ones short-stalked, 5-8 cm. long, 1.3-2 cm. broad, lanceolate, acuminate, cut nearly to the costa or in large specimens the basal segments free; segments 14-16 pairs, oblong, falcate, obtuse, 7-10 mm. long, 3.5-4 mm. broad, contiguous,

the sinuses very narrow, the margins obliquely crenate; costae and costules bearing deciduous shining castaneous bullate scales, with a few pale fibrils intermixed, these extending to the veins, the costules also with a few appressed deciduous hairs above; veins 5-9 pairs, simple or mostly once-forked, very oblique; sori 3-6 pairs, near the costule, occupying one half or more of the segment; indusia castaneous, membranous, globose, bursting irregularly into several spreading persistent calyciform segments; receptacle short, subglobose, setiferous.

TYPE LOCALITY: Near Morces Gap, Jamaica, altitude 1500 meters.

DISTRIBUTION: Confined to forests in the Blue Mountains of Jamaica, altitude 1500 to 1800 meters.

29. *Cyathea furfuracea* Baker, in Hook & Baker, Syn.

Fil. ed. 2. 450. 1874.

Caudex erect, slender, 1-4 (or rarely 12) meters high, 4-7 cm. in diameter, clothed at the summit with linear-lanceolate attenuate rusty-brown scales about 1.5 cm. long; fronds deciduous, usually spreading, the scars in 8-11 ranks, usually close-set and nearly circular, rough, about 1.5 cm. in diameter, or in younger or more rapidly growing specimens the fronds ascending, less readily deciduous, the scars somewhat apart and protuberant, oval to ovate, larger; stipe 20-50 cm. long, densely clothed at the base with scales like those of the upper caudex, freely asperous with stout straight conical spines up to 3.5 mm. long, bright-brown or light-castaneous, deciduously furfuraceous; lamina deeply tripinnatifid, 1-1.5 meters long, narrowly obovate, short-acuminate, the primary rachis short-aculeate or toward the apex muricate, glabrescent, light-brown or yellowish; leaf-tissue delicately chartaceous or with age herbaceous, above dull-green, lighter and grayish-granulose below; pinnae contiguous or imbricate, the basal ones mostly ovate and half the length of the middle ones, the latter mostly oblong, 20-40 cm. long, 7-14 cm. broad, sessile to short-petiolate, short-acuminate, the secondary rachises rusty-strigose above, below yellowish, scabrous, and bearing a few deciduous linear-lanceolate rusty-brown scales; pinnules 18-23 pairs, approximate or subimbricate, sessile, oblong to oblong-lanceolate, pinnatifid nearly to the costa (or at the base rarely pinnate), 3.5-7 cm. long, 9-20 mm. broad, the apex short-acuminate, serrate-crenate; costae rusty-strigose above, below paleaceous, the scales like those of the secondary rachis or (in the outer part) ovate, long-attenuate, subbullate, with long whitish or grayish tortuous hairs intermixed; segments 12-15 pairs, oblong to narrowly oblong, oblique, nearly straight, close, obtuse, the margins flattish or with age recurved, serrulate-crenate, the costules above bearing a few long stiffish hairs, below clothed like the costae; veins 6-8 (9) pairs, simple or once-forked at or below the middle, bearing numerous long whitish hairs below and a few above; sori 3-5 pairs, confluent at maturity; indusium globose, delicately membranous, nearly hyaline, bursting irregularly, the divisions largely disappearing; receptacles dark-brown, relatively small, setiferous.

TYPE LOCALITY: Jamaica.

DISTRIBUTION: Common in the Blue Mountains of Jamaica, in forests and upon partially cleared slopes at from 1200 to 1800 meters altitude; also known from the Gran Piedra, Oriente, Cuba, at about 1100 meters elevation, these specimens smaller than the Jamaican.

30. *Cyathea Harrisii* Underwood, sp. nov.

Caudex erect, 1-2 meters high, 6-8 cm. in diameter, clothed at the top with glossy linear-lanceolate pale-margined castaneous scales about 3 cm. long; fronds spreading, 1.5-2 meters long; stipes relatively slender, light- to dark-castaneous, 35-45 cm. long, bearing numerous short straight spines and clothed at the inner base and above with copious chaff like that of the caudex, above tuberculate; lamina 1.25-1.5 meters or more long, 70-85 cm. broad, deeply tripinnatifid, chartaceous, dark-green above, paler below, the apex short-acuminate; primary rachis light- or yellowish-castaneous, smooth below or slightly tuberculate, scantily rusty-furfuraceous below, glabrescent, above more or less appressed rusty-pubescent; pinnae 40-50 cm. long, 15-19 cm. broad, oblong-lanceolate, short-petiolate, the apex acuminate, the secondary rachis subflexuous, densely appressed rusty-pubescent above, minutely pubescent or glabrate below; pinnules 20-25 pairs, short-petiolate, oblong-lanceolate, about 9 cm. long, 2 cm. broad, approximate or slightly spaced, at the base pin-

nate, above deeply pinnatifid, alate below the abruptly long-acuminate apex, the costae clothed like the secondary rachis, a small tuft of araneose-fibrillose or laciniate rusty scales at the base; segments 16–18 pairs, 10–11 mm. long, 3.5–4 mm. broad, oblong, slightly falcate, obtuse, alternate, the lower ones slightly apart, the upper with narrow sinuses, the margins finely serrulate-crenate; costules, veins and leaf-tissue yellowish-hirsute, especially below, the hairs partially deciduous with age, the costules bearing a few small deciduous fibrillose or laciniate ferruginous scales below; veins 9 or 10 pairs, once-forked below the middle; sori inframedial, ascending two thirds or less the length of the segment; indusia very membranous, rupturing easily into irregular fragments; receptacles elevated, slender, somewhat capitate, hirsute.

Type collected on Blue Mountain Peak, Jamaica, altitude about 2100 meters, April 21, 1903, *Underwood 2502* (herb. N. Y. Bot. Gard.).

DISTRIBUTION: Known only from the upper slopes and summit of Blue Mountain Peak, Jamaica; several collectors.

31. *Cyathea Maxoni* Underwood, sp. nov.

Caudex erect, 4–5 meters high, unarmed, with distant depressed broadly ovate stipe-scars 2.5–3 cm. long (these with protruding fibrovascular bundles), at the top decorated with copious dark-brown shining deltoid-lanceolate long-attenuate scales up to 2 cm. long; fronds ample, spreading; stipe 2 cm. or more in diameter at the base, here densely clothed on the inner side like the caudex, dark, above pale-brownish, sparingly muricate, with a few dark ovate long-attenuate deciduous scales, minutely brownish-furfuraceous; pinnae subsessile, 45–50 cm. long, 15–16 cm. broad, alternate, overlapping at the base, narrowly oblong-lanceolate, abruptly acuminate, dark-green above, glaucous below; primary and secondary rachises pale reddish- or yellowish-brown, minutely furfuraceous, quickly glabrate; pinnules distant, about 25 pairs, spreading, deltoid-lanceolate, 7–8 cm. long, about 1.75 cm. broad at the base, cut about four fifths the distance to the costa, tapering in the outer part rather abruptly to a crenulate caudate apex (1.5–2 cm. long), the costa very minutely puberulent on both surfaces with greatly reduced moniliform hairs; segments about 16 pairs, rigidly coriaceous, oblong, slightly falcate, close, separated by a very narrow acute sinus formed by the reflexed crenulate margins; costules with a few minute reddish-brown bullate scales, also slightly puberulent with minute stiffish hairs; veins about 10 pairs, concealed, mostly once-forked near the base, slightly puberulent below and towards the apex above, the hairs stiffish, short and readily abraded; sori small, about 8 pairs, inframedial, forming a compact row next the costule; indusium globose, pale-brownish, very membranous, rupturing irregularly; receptacle short, globose, hirsute.

Type collected on mountains 5 miles south of Cartago, Costa Rica, altitude about 1800 meters, in a humid forest opening, May 12, 1906, *Maxon 524* (herb. N. Y. Bot. Gard.).

DISTRIBUTION: Known only from this collection.

32. *Cyathea onusta* Christ, Bull. Herb. Boiss. II. 4: 950. 1904.

Cyathea membranulosa Christ, Bull. Herb. Boiss. II. 7: 271. 1907.

Caudex erect, 2–3 meters high, very stout, the summit somewhat scaly and rough with the spiny stipe-bases of previous seasons, without definite scars; fronds ample, tripinnatifid, spreading; stipe very stout, 50–60 cm. long, deeply and irregularly canaliculate, dark-brownish, dull crispate-furfuraceous, thickly armed with stout conical spines 4–8 mm. long (borne singly or in pairs), tuberculate with age, densely paleaceous on the inner side, the scales 2–3 cm. long, lanceolate, attenuate-subulate, dark lustrous brown with lighter margins; rachis stout, light yellowish-brown to brownish-castaneous, glabrescent, minutely papillose, muricate or slightly spiny toward the base; pinnae dark-green above, blackish upon drying, bright clear green below, mostly subopposite, strictly sessile, 55–70 cm. long, 15–20 cm. broad, ovate-oblong, not narrowed at the base, rather short-acuminate, the secondary rachis light-brownish, sulcate, minutely apiculate-papillose, below minutely puberulo-furfuraceous, glabrescent, above brownish-pilose; pinnules 25–28 pairs, approximate or mostly imbricate, narrowly oblong-lanceolate, acuminate, 9–12 cm. long, up to 2.5 cm. broad at the base, cut nearly to the costa (in the fertile pinnules rather more deeply), the

costa brownish-pilose above, below sparingly puberulo-squamose and with a few broad delicate whitish caducous scales; segments 18–20 pairs, slightly falcate, linear-oblong, obtuse, up to 1.3 cm. long and 4 mm. broad, slightly dilatate, the lowermost a little apart, all connected by a narrow wing, the margins subentire or obscurely crenate, reflexed, ciliate, the costules with a few minute pallid scales like those of the costa; veins 10–12 pairs, mostly once-forked close to the costule, mainly soriferous, bearing a few short scattered hairs, a few also between the veins; sori 8–10 pairs, large, globose, greenish-yellow, close to the costule; indusium delicately membranous, completely investing the sporangia, diaphanous, rupturing irregularly, the lacerate fragments mixed among the crowded sori, at length mostly disappearing; receptacles large, somewhat elevated, appearing more so from the thick rugose character of the leaf-tissue beneath.

TYPE LOCALITY: Costa Rica.

DISTRIBUTION: Interior mountain region of Costa Rica, up to nearly 2000 meters elevation, upon partially open slopes.

33. *Cyathea suprastrigosa* (Christ) Maxon.

Hemitelia suprastrigosa Christ, in Pittier, Prim. Fl. Costar. 3: 44. 1901.

Cyathea conspicua Christ, Bull. Herb. Boiss. II. 6: 178. 1906.

Caudex erect, slender, the base conical from the presence of aerial roots, the upper portion clothed with lustrous bright-brown elongate scales (15 mm. long) between the closely tessellate rounded scars (3 cm. in diameter); fronds rather small, the stipe clothed at the base with bright-brown lanceolate-subulate scales up to 3.5 cm. long and there bearing numerous very short conical spines, above nearly or quite unarmed and, together with the primary rachis, brownish-yellow, minutely furfuraceous; lamina deeply tripinnatifid, the leaf-tissue chartaceo-coriaceous, dull-green above, paler below; pinnae about 50 cm. long, 14–19 cm. broad, subsessile, oblong-lanceolate, acuminate, the secondary rachis dull-yellowish, sulcate, laxly and deciduously furfuraceous; pinnules 22–25 pairs, sessile, approximate, spreading, 7–11 cm. long, 1.5–2.5 cm. broad, oblong-lanceolate, very deeply pinnatifid, the apex acuminate-caudate, serrate, the costa densely brownish-strigose above, below bearing a few appressed whitish or pale-yellowish ovate to ovate-lanceolate deciduous scales; segments 15–18 pairs, elongate-oblong, falcate, 8–13 mm. long, 3–4 mm. broad, obtuse, dilatate, separated by an acute sinus 2–3 mm. broad, the margins more or less revolute, sharply bicrenate-serrate; costules very scantily and deciduously pilose above and with 2 or 3 stiffer subpersistent hairs at the apex, below conspicuously light-paleaceous, the scales bullate, erose-lacerate, and somewhat imbricate; veins about 10 pairs, once-forked below the middle, obscurely setulose below, above bearing a few very slender lax tortuous hairs, these scarcely persistent; sori large, 6–8 pairs, seated near the costule, confluent at maturity; indusium globose, thin, dark-grayish, bursting irregularly, only the lower portion commonly persistent; receptacle dark-brownish, elevated, broadly capitate, setiferous.

TYPE LOCALITY: Forests of Achiote, volcano Poas, Costa Rica, altitude 2200 meters.

DISTRIBUTION: Known only from the volcanoes Poas, Irazú and Turrialba, Costa Rica, at from 2000 to 2350 meters altitude.

34. *Cyathea aphlebioides* Christ, Bull. Herb. Boiss. II. 6: 179. 1906.

Caudex undescribed; stipe stout, 2.5 cm. in diameter at the base, ochraceous, shining, armed with numerous almost spirally arranged stout conical subintrorse spines about 5 mm. long and clothed at the base with shining blackish scales more than 1 cm. long with whitish ciliate-lacerate margins; rachises dark-purplish, the uppermost portions reddish-stramineous, slightly rugose, nearly smooth; lower pinnae deflexed, 30 cm. long, with abortive irregularly incised pinnules scarcely 3 cm. long; characteristic pinnae up to 50 cm. long, 17 cm. broad, short-petiolate, acuminate, scarcely narrowed at the base; pinnules about 35 pairs, close, sessile, about 9.5 cm. long, 1.8 cm. broad, very deeply pinnatifid, the apex linear-caudate, dentate; costae and costules sparingly clothed below with deciduous bullate ovate erose-lacerate ferruginous scales, with yellowish-white hairs intermixed; segments about 20 pairs, 9–10 mm. long, about 3 mm. broad at the base, close, falcate, sub-

acute, lightly serrate-crenate ; veins 10-12 pairs, evident, very oblique, mostly once-forked below the middle or in sterile segments again forked, copiously yellowish-pilose, the leaf-tissue between them slightly pilose ; sori rather large, globose, close, inframedial, about 5 pairs, confined to the lower half of the segment ; indusium delicate, yellowish-brown, bursting into a few irregular subpersistent fragments ; receptacle elevated, dark, capitate, conspicuously setiferous.

TYPE LOCALITY : Navarro, Costa Rica.

DISTRIBUTION : Known only from Costa Rica.

35. *Cyathea conspersa* Christ, Bull. Herb. Boiss. II. 5 : 260. 1905.

Cyathea furfuracea Christ, Bull. Herb. Boiss. II. 4 : 950. 1904. Not *C. furfuracea* Baker, 1874.

Cyathea Underwoodii Christ, Bull. Herb. Boiss. II. 6 : 183. 1906.

? *Cyathea caduca* Christ, Bull. Herb. Boiss. II. 7 : 271. 1907.

Caudex erect, slender, unarmed, 4-6 meters high, 5-7 cm. in diameter, slightly paleaceous at the top, the stipe-scars large, oval, about 5 cm. long, nearly 3 cm. broad (maximum), approximate, 6-ranked ; fronds ample, wide-spreading, sometimes wholly deciduous seasonally ; stipe 30-40 cm. long, stout, strongly arcuate at the base, dull dark-brownish, irregularly sulcate, armed with short (2 mm. or less) straight or retrorse conical spines and clothed with long-attenuate deltoid-lanceolate shining dark-brown deciduous fimbriate scales, these subpersistent on the upper surface ; lamina ample, deeply tripinnatifid, broadly ovate, short-acuminate, with about 25 pairs of close alternate herbaceous pinnae, the lowermost somewhat reduced ; primary rachis stout, light- or dull-yellowish, deciduously squamulose and smooth, or toward the base sparingly muricate and deciduously paleaceous ; middle pinnae 40-50 cm. long, 12-13 cm. broad, narrowly oblong-lanceolate, sessile, acuminate, strongly imbricate, the secondary rachis stramineous or yellowish, smooth, sulcate, slightly araneose-furfuraceous below ; pinnules about 30 pairs, oblong-lanceolate, 6.5-8 cm. long, 12-15 mm. broad, apart, sessile, spreading, abruptly acuminate-caudate, cut four fifths or more to a costal wing 1 mm. or more wide upon each side ; segments 14-17 pairs, oblong, slightly falcate, obtuse, about 7 mm. long, 4 mm. broad at the dilatate base, 3 mm. broad above, separated by a narrow acute sinus, the margins conspicuously crenate-serrate ; costae conspicuously yellowish-strigose above, below (together with the costules) scantily and minutely paleaceous with brownish or olivaceous scales and obscurely pilose, with a few larger scales intermixed, those of the costules bullate ; veins 7-8 pairs, mostly soriferous, simple or mostly once-forked near the base, glabrous ; sori near the costule, small ; indusium yellowish to olivaceous, delicately membranous, rupturing irregularly ; receptacle dark-brown, small, elevated, capitate, setose.

TYPE LOCALITY : Costa Rica.

DISTRIBUTION : Costa Rica ; of general distribution in the interior mountainous regions, at from 1350 to 2000 meters altitude.

36. *Cyathea delicatula* Maxon, Contr. U. S. Nat.

Herb. 13 : 4. 1909.

Trunk and stipe wanting ; primary rachis unarmed, slight, the under surface greenish-yellow, minutely puberulo-furfuraceous, glabrescent, the upper surface brownish-olivaceous and densely strigose with jointed beadlike closely appressed brownish hairs ; pinnae alternate, the largest 43 cm. long, 10-11 cm. broad, sessile, lanceolate, acuminate, comprising about 30 pairs of straight linear-lanceolate membranous spaced pinnules ; secondary rachis slender, this and the costae very densely strigose above like the main rachis, minutely glandular-pubescent below ; pinnules 5.5-6 cm. long, 7.5-9 mm. broad, very deeply pinnatifid into about 20 pairs of narrowly oblong nearly straight unequally rounded or subacute segments ; segments 4-5 mm. long, about 2 mm. broad at the middle, the sinuses acute, the margins lightly crenate-serrulate in the outer part, the costules sparingly pubescent, bearing also numerous ovate acuminate bullate reddish-brown scales ; veins 7 or 8 pairs, sometimes simple, mostly once-forked at a slight angle, concealed, setulose ; sori small, 5 or 6 pairs, inframedial, seated at the fork of the veins ; indusium hyaline, very deli-

cately membranous, bursting irregularly, evanescent, or the inferior portion subpersistent as a shallow scale; receptacle small, slightly elevated, hirsute.

TYPE LOCALITY: Summit between Tactic and Coban, Alta Verapaz, Guatemala, altitude 2000 meters.

DISTRIBUTION: Known only from the original collection (*von Türckheim II. 1629*).

37. *Cyathea Jurgensenii* Fourn. Mex. Pl. Crypt. 135. 1872.

Caudex and stipe undescribed; primary rachis pale, sulcate, finely muricate, appressed-pubescent above; pinnae petiolate (up to 2 cm.), rigidly membrano-herbaceous, dark-green above, bright clear green below, oblong-lanceolate, 55 cm. or more long, 12-19 cm. broad, abruptly acuminate, the apical portion deeply and obliquely serrate, the secondary rachis stramineous, smooth or delicately muricate below, glabrescent, a few minute brownish squamules adhering to the sides, above rusty strigose; pinnules articulate and readily separable, petiolate (the lowermost 3 mm.), 20-25 pairs, lanceolate, 7-10 cm. long, 1.5-2 cm. broad, very deeply pinnatifid, acuminate, the costa rusty-pilose above, below castaneous and glabrous or with an occasional small yellowish-brown scale; segments 18-20 pairs, close, ovate-oblong, falcate, acute, glabrous throughout upon both surfaces, or with a few deciduous linear scales upon the costule below, the margins obscurely crenate-serrate; veins dark, about 9 pairs, simple or mostly once-forked about half way to the margin, glabrous; sori 4-8 pairs, borne at the forking of the veins, distinctly apart from the costule; indusium globose, membranous, pale-yellowish, bursting irregularly, the flat lobate basal portion persistent, calyciform; receptacle yellowish, small, slightly elevated, hirtous.

TYPE LOCALITY: Cordillera of Oaxaca, Mexico.

DISTRIBUTION: States of Oaxaca and Vera Cruz.

38. *Cyathea aureonitens* Christ, Bull. Herb. Boiss. II. 4: 948. 1904.

Caudex erect, 3-4 meters high, about 15 cm. in diameter, the upper portion very densely clothed with bright-brown crispate divergent capillary scales, with numerous protruding sharp blackish spines 13 mm. or less long; fronds 6-8, all falling together seasonally, borne in definite successive zones 20-30 cm. apart, those of the season in a close crown about 15 cm. below the protruding included chaffy apex; stipe stout, 75 cm. or more long, very densely clothed and armed like the upper trunk; lamina 2.5 meters or more long, ovate, passing abruptly into a subacute apex; rachises smoothish or slightly muricate, rich yellowish-brown or with age castaneous, deciduously rusty-furfuraceous; pinnae alternate, broadly lanceolate, 75-85 cm. long, 25-30 cm. broad, sessile, acuminate, the leaf-tissue rigidly coriaceous, dull dark-green above, below yellowish-green and glaucescent; pinnules deciduous, 35-40 pairs below the deeply serrate apex, sessile, 14-16 cm. long, 2.3-2.8 cm. broad, lanceolate to deltoid-lanceolate, long-attenuate, spreading at right angles or the lower ones a little deflexed, contiguous or overlapping at the base, incised nearly to the costa, the costa yellowish-brown, with a conspicuous tuft of fuscous filamentous scales at the base, elsewhere sparingly covered with small firm blackish or dark-brown contracted stellate scales, these extending to the costules, veins and along the margins; segments about 30 pairs below the crenate-caudate apex, 12-13 mm. long, about 4 mm. broad, approximate, connected by a narrow wing about 1 mm. wide, strongly falcate, obtuse or subacute, rigid, the margins subentire, usually reflexed; veins about 16 pairs, once-forked near the base; sori large, 7-9 pairs, close to the costule, covering nearly two thirds of the segment; indusium brownish, firm, opaque, rupturing into a few irregular saccate divisions, these persistent; receptacle large, brownish, elevated.

TYPE LOCALITY: Costa Rica.

DISTRIBUTION: Confined to Costa Rica; not uncommon in humid forest ravines, mainly of the central mountain region, at from 1000 to 2000 meters elevation.

39. *Cyathea punctifera* Christ, in Pittier, Prim. Fl.

Costar. 3: 40. 1901.

Caudex erect, 7 meters high, 30 cm. in diameter, densely covered with brown adventive roots; stipe stout, 3 cm. in diameter at the base, bearing scattered slender purplish-

black spines 4–7 mm. long and clothed with a dense covering of deciduous subcrispate short slender grayish-yellow irregularly serrate scales; lamina very ample, deeply tripinnatifid, the primary rachis brownish or with age rich purplish-brown and lustrous, with small deciduous scales like those of the stipe and squamulose-scabrous with very minute dark-brownish substellate scales, glabrescent; pinnae 14 or 15 pairs, alternate, sessile or short-petiolate (up to 1.5 cm.), lanceolate, 80–100 cm. long, 16–22 cm. broad, abruptly long-acuminate, the secondary rachis sulcate and dark-pilose above, below light-brownish or with age purplish-brown, with a subsquamulose covering of minute dark substellate scales, a few larger light-colored ones subpersistent at the sides, eventually glabrate, lustrous; pinnules 25–33 pairs, approximate, sessile, rigidly herbaceous, bright-green, nearly concolorous, patent (or the lower ones retrorse), oblong, 8–11.5 cm. long, 1.5–2.5 cm. broad, the apex abruptly caudate and lightly crenate, the costa dark, densely strigose above with dark-brown hairs, below laxly short-furfuraceous with grayish-brown stellate squamules and in the outer portion rusty-pilose; segments 23–25 pairs, linear-oblong, 8–12 mm. long, 2–3 mm. broad above the slightly dilatate base, oblique, parallel, subfalcate, obtuse, the margins entire or nearly so, scarcely revolute, the costule clothed with small grayish stellate hairs, these extending along the veins and margins of the segment; veins 10–13 pairs, dark, evident, mostly once-forked near the base; sori 2–8 pairs, seated at the forking of the veins; indusium globose, dark-brown, very firm, bearing numerous persistent hairs, bursting irregularly into 3 or 4 large erect saccate lobes; receptacle globose, setiferous.

TYPE LOCALITY: Forests of Tuis, Costa Rica, altitude 650 meters.

DISTRIBUTION: Costa Rica and eastern Nicaragua.

40. *Cyathea Trejoi* Christ, Bull. Herb. Boiss. II. 5: 733. 1905.

Caudex erect, long and slender, very spiny, without definite scars; rachis stout, 2 cm. or more in diameter, stramineous or reddish, unarmed, shining; pinnae articulate, readily deciduous, long-petiolate (4 cm. or more), narrowly ovate, 30 cm. or more long, 10 cm. broad, acuminate, scarcely narrowed at the base; pinnules about 20 pairs, approximate, sessile, articulate, readily separable, lanceolate, 5.5 cm. long, 1.2–1.5 cm. broad, acuminate, cut nearly to the costa, the costa scantily yellowish-pilose; segments about 15 pairs, 6–7 mm. long, about 3 mm. broad, oblong, slightly falcate, obtuse, crowded, separated by a very narrow obtuse sinus, slightly dilatate, joined by a very narrow costal wing, dark-green above, below paler and subglaucous, the margins lightly and obscurely crenate, the costules naked above, below bearing a few hairs near the base; veins about 6–8 pairs, dark, mostly simple, glabrous; sori very small, 2 or 3 pairs, close to the costule, occupying the basal portion of the segment; indusium grayish, membranous, globose; receptacle small, blackish, scarcely elevated.

TYPE LOCALITY: San Pablo, State of Chiapas, Mexico, altitude 1500 meters.

DISTRIBUTION: Known only from the type collection (*Munch*).

41. *Cyathea patellaris* Christ, Ann. Conserv. Jard. Bot.

Genève 4: 207. 1900.

Caudex erect, stout, clothed above with long grayish subulate scales and armed with broad dark curved spines; stipe undescribed; rachis stramineous-brownish, unarmed, lightly and laxly puberulo-furfuraceous, glabrescent; pinnae oblong-lanceolate, about 60 cm. long, 15–18 cm. broad, subsessile to short-petiolate (1.5 cm.), short-acuminate, the secondary rachis strigose above, below laxly puberulous; pinnules chartaceo-coriaceous, dull-green above, paler below, about 35 pairs, subsessile, oblong-lanceolate, 8–9 cm. long, 1.3–1.7 cm. broad, deeply pinnatifid into about 18 pairs of segments below the lightly biserrate caudate apex, the costa elevated upon both surfaces, strigose above, below minutely squamulose toward the base, glabrescent, scantily pubescent toward the apex; segments oblong, subacute, falcate, 7–9 mm. long, 2.5–3 mm. broad above the dilatate base, connected by a costal wing about 1 mm. or more broad, the margins lightly crenate, the costules glabrous above, nearly or quite so below; veins evident, 8–10 pairs, mostly once-forked (the lowermost and the upper ones often simple), glabrous; sori small, 6–8 pairs, seated at or below

the forking of the veins, near the costule, close, strongly confluent at maturity; indusium rupturing irregularly, wholly evanescent or the inferior portion persistent; receptacle short, grayish, depressed-globose or crateriform, setiferous.

TYPE LOCALITY: Banks of the Rio de Las Vueltas, Tucurrique, Costa Rica, altitude 635 meters.
DISTRIBUTION: Known only from Costa Rica.

42. *Cyathea basilaris* Christ, Bull. Herb. Boiss. II. 4: 949. 1904.

Cyathea reticulata Wercklé; Christ, Bull. Herb. Boiss. II. 5: 251. 1905.

Caudex and stipe undescribed; rachis stout, unarmed, dull yellowish- or reddish-brown, clothed with short detergible squamules and a few pale ovate scales with darker centers; pinnae 60–70 cm. long, 20–22 cm. broad, sessile or nearly so, lanceolate, acute or short-acuminate, the secondary rachis similar to the primary, light reddish- or yellowish-brown, rusty-furfuraceous below, glabrescent, with a few whitish fibrillose scales intermixed, these with a dark reddish-brown median stripe, above densely covered with appressed fulvous hairs; pinnules 30–35 pairs, spreading, subdistant or approximate, strictly sessile, linear-lanceolate, about 10–12 cm. long, 1.7–2 cm. broad, long-acuminate, subcaudate, cut nearly to the light-brownish costa, this decidedly furfuraceous below, with slender deciduous whitish striped scales intermixed; segments 20–26 pairs, about 9 mm. long, 2.5–3 mm. broad, yellowish-glaucous below, dark-green above, somewhat spaced, slightly dilatate, connected by a very narrow wing, the margins inflexed, obscurely crenate, more deeply so at the subobtuse apex; costules sparsely squamose at the base below, glabrescent, above glabrous; veins dark-brownish, 10–12 pairs, evident, mostly once-forked near the base; sori 1–5 pairs, yellowish-brown, borne close to the costule, occupying the lower portion of the segment; indusium shallow, rupturing more or less unevenly, the base usually persistent as a disciform saccate scale; receptacle somewhat elevated, stout, capitate, setiferous, with age grayish and glabrate.

TYPE LOCALITY: Costa Rica.

DISTRIBUTION: Mountains of Costa Rica, up to 1800 meters altitude.

43. *Cyathea mexicana* Schlecht. & Cham. Linnaea 5: 616. 1830.

Cyathea hexagona Fée & Schaffn.; Fée, Mém. Foug. 8: 111. 1857.

Cyathea articulata Fée, Mém. Foug. 8: 111. 1857.

Cyathea glauca Fourn. Mex. Pl. Crypt. 135. 1872. Not *C. glauca* Bory.

Cyathea arida Christ, Bull. Herb. Boiss. II. 6: 180. 1906.

Caudex erect, 8–10 meters high, unarmed; stipe stout, sulcate above, brownish, opaque, minutely furfuraceous, toward the base sparingly clothed with slender spinescent-ciliate brown scales about 1 cm. long, and armed with slender conical slightly curved shining purplish-black spines up to 6 mm. long; primary rachis stout, light-brownish to yellowish-castaneous below, lighter in the upper portion, papillose, lightly puberulo-furfuraceous, glabrescent; pinnae dark-green above, pallid and somewhat glaucous below, variable in dimensions, up to 85 cm. long and 20 cm. broad, oblong-lanceolate or narrowly so, acuminate, subsessile or petiolate, close or slightly imbricate, deciduous with age, the secondary rachis stramineous to light-castaneous, yellowish- or whitish-squamulose below, glabrescent, rusty- or brownish-strigose above; pinnules articulate, readily separable, 30–40 pairs, distant to subdistant, narrowly oblong-lanceolate, variable in size, up to 10 cm. long and 1.6 cm. broad, usually smaller, sessile or subpetiolate, deeply pinnatifid, the long-acuminate apex serrulate to obscurely crenulate-serrate; costae rusty-strigose above, below (especially toward the apex) with a scant covering of whitish or yellowish antrorse hairs, toward the base minutely squamulose, the squamules somewhat deciduous, whitish, and with dark-tipped processes; segments 18–20 pairs, oblique, oblong to linear-oblong, falcate or subfalcate, connected by a wing 1–1.5 mm. broad upon each side of the costa, the margins mostly reflexed, obscurely serrulate, more noticeably so at the acute apex, the costules scantily furfuraceo-pilose below, glabrous above, except for 1 or 2 stiffish hairs near the apex; veins 8–12 pairs, simple or once-forked, evident, usually (together with the leaf-tissue below) minutely whitish glandular-pubescent; sori 4–7 pairs, close to the costule, extending two thirds or less the distance to the apex; indusium globose, delicately membranous, pale-

yellowish or grayish-brown, quickly breaking into numerous fragments, few of these persistent; receptacle relatively large, elevated, capitate, dark-brown, setiferous, fragile.

TYPE LOCALITY: Jalapa, Mexico.

DISTRIBUTION: Humid regions of Vera Cruz, Mexico, southward to Chiapas and Alta Verapaz, Guatemala, up to 1300 meters altitude; also in Costa Rica.

DOUBTFUL OR EXTRALIMITAL SPECIES

Cyathea conquisita Jenman, Jour. Bot. 20: 324. 1882. Known only from the original specimens from Jamaica, *Wilson 134*, in the herbarium of the British Museum (Natural History). See under *C. pendula* Jenman, below.

Cyathea fulva (Mart. & Gal.) Fée, Mém. Foug. 9: 34 (25). 1857. (*Alsophila fulva* Mart. & Gal. Mém. Acad. Brux. 15⁵: 78. pl. 23. 1842.) Type from the forests of Villa Alta, Oaxaca, Mexico, altitude 1500–1800 meters, *Galeotti 6346*. Apparently a very fertile contracted form of *C. mexicana*, but only fragments of the original number have been seen.

Cyathea guadeloupensis Spreng. Nova Acta Acad. Leop.-Carol. 10: 233. 1821. Very briefly described upon Guadeloupe specimens collected by Bertier and Perrin. Referred by Christensen to *C. arborea*, but whether rightly or not is problematical without an examination of the original specimens.

Cyathea moniliformis Jenman, Ferns Brit. W. Ind. 59. 1898. According to the original description the source of the type specimens is unknown. Christensen (Index Fil. 193. 1905) attributes the species to Central America. The specimen of the Jenman herbarium at the New York Botanical Garden is marked as from Trinidad; probably with correctness, and the species thus falls without the range of the present treatment.

Cyathea monstrabila Jenman, Jour. Bot. 19: 275. 1881. Founded upon specimens collected by Nock in the high forest near Portland Gap, in the Blue Mountains of Jamaica, altitude 1500–1800 meters. Jenman subsequently (Bull. Dep. Agr. Jamaica 29: 7. 1892) regarded it as evidently an abnormal state, possibly of a species otherwise unknown, and called attention to differences in vestiture and color distinguishing it from *C. furfuracea* Baker and the species here described as *C. Harrisii*. The type specimens (herb. N. Y. Bot. Gard.) appear to the writer to represent a juvenile monstrous form of a species nearest *C. furfuracea*, or possibly of that species itself.

Cyathea muricata Willd. Sp. Pl. 5: 497. 1810. Founded upon Plumier's *plate 4* (Traité Foug.), representing a plant from Martinique. Baker, following Kaulfuss, has regarded Sieber's *no. 374* from Martinique as agreeing with the plate; but the resemblance is slight. Sieber's plant is a large state of *Cyathea tenera*; and the plant figured by Plumier is, so far as the writer knows, yet to be rediscovered. The *C. muricata* of Grisebach is said by Christensen to be *C. furfuracea* Baker. Costa Rican specimens (*Pittier 1839*) determined by Bommer as "*Cyathea muricata* Willd. (non Kaulf.)" are *Cyathea onusta* Christ.

Cyathea papyracea Christ, Bull. Herb. Boiss. II. 4: 946. 1904. Very briefly described from Costa Rican specimens, *Wercklé 52*. From fragmentary material seen it appears to be closely related to *C. onusta* or to be possibly a form of that species.

Cyathea patens Karst. Fl. Columb. 2: 173. pl. 191. 1869. A Colombian species recorded from Costa Rica by Bommer and Christ (Bull. Soc. Bot. Belg. 32: 176. 1893) upon the basis of specimens collected on the volcano Irazú, altitude 2000 meters, *Pittier 4175*. These, however, are *Cyathea suprastrigosa* (Christ) Maxon, only superficially resembling *C. patens*.

Cyathea pendula Jenman, Jour. Bot. 20: 324. 1882. Known only from the original specimens, Jamaica, *Wilson 16*, in the herbarium of the British Museum (Natural History). This and *Cyathea conquisita* (mentioned above) were founded upon material regarded by Jenman as "insufficient to show whether they are simply bipinnate or tripinnate species"; the former supposition was "inferred from the fact of the rachises being channelled."

PARTS OF VOLUMES PREVIOUSLY PUBLISHED

- 7¹: 1-82. Ustilaginales : Ustilaginaceae, Tilletiaceae.
- 7²: 83-160. Uredinales : Coleosporiaceae, Uredinaceae, Aecidiaceae (pars).
- 9¹: 1-72. (Agaricales :) Polyporaceae (pars).
- 9²: 73-132. (Agaricales :) Polyporaceae (conclusio).
- 17¹: 1-98. Pandanales : Typhaceae, Sparganiaceae. Naiadales : Zannichelliaceae, Zosteraceae, Cymodoceaceae, Naiadaceae, Lilaeaceae. Alismales : Scheuchzeriaceae, Alismaceae, Butomaceae. Hydrocharitales : Elodeaceae, Hydrocharitaceae. Poales : Poaceae (pars).
- 22¹: 1-80. Rosales : Podostemonaceae, Crassulaceae, Penthoraceae, Parnassiaceae.
- 22²: 81-192. (Rosales :) Saxifragaceae, Hydrangeaceae, Cunoniaceae, Iteaceae, Pterostemonaceae, Hamamelidaceae, Altingiaceae, Phyllonomaceae.
- 22³: 193-292. (Rosales :) Grossulariaceae, Platanaceae, Crossosomataceae, Connaraceae, Calycanthaceae, Rosaceae (pars).
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